

UNIVERSAL

MODEL

# AIRPLANE

NEWS

OCT.  
1932

15¢

A COURSE IN AVIATION FOR FIFTEEN CENTS A MONTH!



THE WHITE DOLPHIN AT THE FRONT

# If Michael Angelo had been a model airplane builder-

he would have enjoyed building Cleveland-Designed models. He loved details—he loved to do things right. One day when someone told him not to bother so much with details, he answered in kind: "It's the infinite care of the details that makes the finished job perfect". We of Cleveland second that notion. And so when model builders and even model consumers say about us that our models, and particularly the photos of them, look too real—look too good to be true—we simply answer that they don't look too real to us. In fact, we're always endeavoring to make them look and be more realistic. This whole business with us is very much of a scientific hobby and we believe there are thousands of other model enthusiasts who love to do things as perfectly as possible. So you know that all photographs on this

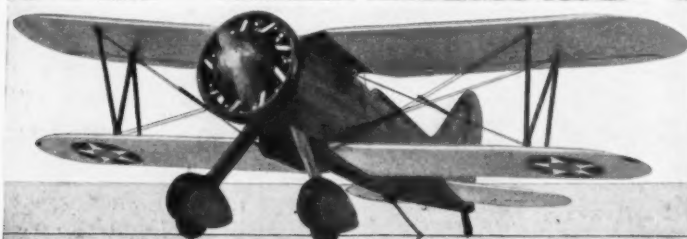
page as well as all the photographs used in any of our advertising of scale models are of the actual Cleveland-Designed models themselves, not retouched photographs of the real airplanes as skeptics are inclined to believe. They should build a few of these models to see the truth of our statement of the actual models looking even better than the photographs (not only because of the coloring but also because of the many details which cannot all be seen on the photographs). Contrary to the practice of many advertisers, we do not retouch photographs to bring out artificial beauty (1) covering the entire photograph in the process so that it looks like a hand-drawn sketch. We are proud of our productions and give our artists strict instructions not to doll up photographs, only backgrounds, to place in clouds or landscapes and to brush over the small blemish to give the appearance of the propeller whirr, except where details fade into backgrounds and where uneven blotches of coloring are magnified by the powerful lights which reflect through the surfaces.

## Here's a Real Bargain Offer

for those who want drawings only. In order to give many of those who do not know what Cleveland-Designed models are like, but only wish drawings, we have had specially printed drawings of two of our latest models, the DeHavilland-4 Battleplane, and the Curtiss JN4 Training Plane. Drawings alone each 35c or two for 50c. Postfree. No other drawings available. This is just another introductory offer at a still cheaper price so that everyone has a chance to see what Cleveland-Designed models really are like. While they last.

SEE WHAT  
\$1.95  
WILL BUY

HERE'S a brand-new way of offering Cleveland-Designed flying kits with balsa wood all printed out for you, strips all cut to the proper thicknesses and accurately, only as working out to the 1/4" scale, all the details the dummy motor which we now employ cut from flat stock for accuracy and detail. Plenty of cement and paper cement (or B.O.), two bottles of the newly perfected Cleveland Pigmented Model Dopes (beautiful opaque colors now), etc., etc., are supplied, to say nothing of all the little things like Japanese paper, music wire, iron hinge wire, simple to assemble Cleveland-Designed hubs, indestructible fibre propeller parts, right down to the last detail of thread for brace wires, for Cleveland Model & Supply Co. is the home of complete kits that ARE complete and of quality far beyond the average.



## AKRON FIGHTER F9C-2

Illustrations Show It Coming In For a Deck Landing With Hook of Cleveland's New Arresting Gear Dropped in Place and Also Taking Off. (Deck Level Photos.)

The U. S. Navy's newest and smallest Curtiss fighter. It is Cleveland's new beauty destined to be the successor of the Laird Super-Solution for beauty and flights and almost everyone knows of the Gee-Dee Laird SF-5 (which sells at \$2.50). It is a very consistent flying model and a real beauty in appearance. Detailed only as Cleveland details its models, including authentic gull shaped upper wing at the proper dihedral angle, the two leg landing gear which is very strong when built as Cleveland designs 'em, windshield sights, etc. All balsa comes printed out on flat sheets including curved parts, dummy motor, motor end rings, wheels and all—easy to build Gee-Dee ships now! Neither this ship nor the new Boeing are at all hard to make if some model experience is had. The fact is that they are about as simple as the Howard to build, but having more parts the same as the simple Gee-Dee model, take longer. Being a 3/4" scale model, its span is 19 1/4", length 15 1/4", weight 2.2 ozs. Colored silver wings and tail, everything else blue except details which may be colored black with ink. The kit comes complete with everything needed for only \$1.95 postfree. Order Kit SF-22. Insurance 5c extra.

## The Gee-Bee and Howard All White Racer Models Still Going Strong



The Gee-Bee is still an extremely popular model—record flight by a Canadian man 962 ft. For the price of \$1.50 you get an accurate 3/4" scale model, span 17 1/2", length 12", weight 1.5 ozs. Colored yellow and black. Complete Kit SF17 with everything needed only \$1.50 postfree.



The Howard Racer model is still being sold at the price of \$1.00 complete including all materials, dopes and drawings. This, as all our SF models, is 3/4" scale. Span 15", length 13 1/4", weight 1 3/10 ozs. Complete Kit SF-18, including everything needed, mailed post-free anywhere for only \$1.00.

## Seen It?

Have you seen the latest C.M.E. Technical Bulletin for Cleveland Model Engineers? If you're a regular Cleveland customer, you receive this without charge, but if you're not, 5c will start bringing copies to you until you do become a regular customer. It is fully and generously illustrated with Cleveland's great line of 43 wonderful models. Every one authentic—all fly marvelously. Send for it today if you have never received a copy. Especially needed by men and boys who are beginning their winter model work or those who have recently joined school clubs. Send 5c for your copy today.

If your dealer can't supply you-use this coupon

CLEVELAND MODEL & SUPPLY CO.,  
"Where Complete Kits ARE Complete"  
1866-N10 West 57th Street, Cleveland, Ohio, U. S. A.

Gentlemen:  
Enclosed find..... for the following items which I have checked:

Kit SF-22	\$1.95	DH4 drawing	.25
Kit SF-23	1.95	JN4 drawing	.25
Kit SF-18	1.00	Both drawings	.50
Kit SF-17	1.50	CME News	.65
Kit SF-5	2.50	Insurance	.65

Print Name .....

Address .....

City..... State.....

Age..... yrs. Model Experience..... yrs.

I am pinning to this coupon a list of the models I would like to see Cleveland-Designed, especially at the low prices for which Cleveland designs authentically.

## CLEVELAND MODEL & SUPPLY CO.

1866-N10 West 57th Street

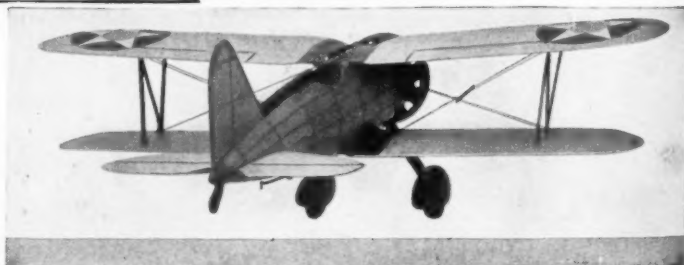
Cleveland, Ohio, U. S. A.



## BOEING XP936

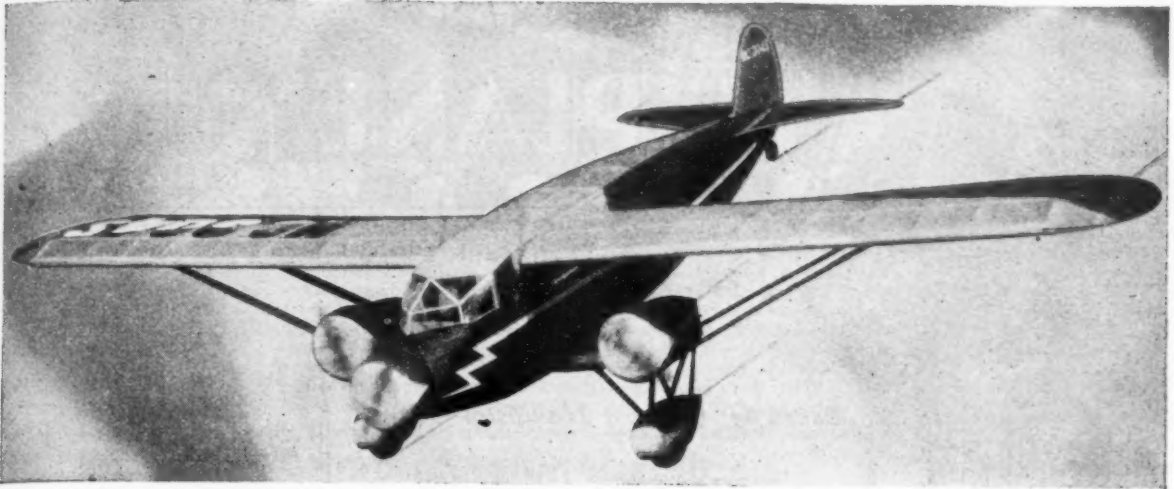
Illustration Shows It Climbing on the Turn  
(Note the Complete Motor and Ring)

This is Boeing's brand new fighter which is on the Army "Secret List". So new that it still has the "X" letter designating it is an experimental Pursuit job. It is a radical departure from the usual U. S. fighting aircraft, being a low wing design. It is capable of well over 230 MPH. The model is detailed as authentically as possible with its numerous little gadgets, the P-W Wasp motor and Boeing end ring which you easily make, etc., etc. One of the finest and most detailed of all Cleveland-Designed models. Due to its fairly large wing area, its flying qualities are excellent. Being a 3/4" scale model, its span is 20 1/4", length 17 1/4", weight 2.5 oz. Colored yellow wings and tail surfaces, everything else olive drab except the few details which may be colored black with ink. Price for the entirely complete Kit SF-23, all balsa printed out, etc., postfree, \$1.95. Insurance 5c extra.



# NEW! First Time Offered! Another Scientific Sensation!

## FLYING SCALE TRI-MOTORED STINSON AIRLINER



And Now Comes Another Scientific Triumph!  
A tri-motored airliner that has been faithfully reproduced—a true-to-scale model that gives breath-taking performance on the air, and as you can readily conclude—the result of many months of planning, designing, experimenting and testing. And what a low price! Every boy can well afford to buy a Stinson Airliner now. Our buying power is so great that it enables you to get the highest quality merchandise at the lowest possible prices, with 3 hour service. And just look at these specifications:

Wing Span, 26 1/4"; Length, 17 1/2"; Weight, 1 oz.  
Colors: Green and White.

Complete Kit

**150**

post paid

A Kit That Is An Astounding Value!

No manufacturer has ever put more into a kit,—or taken more out of the price than SCIENTIFIC this year.

Here's what your \$1.50 brings you:

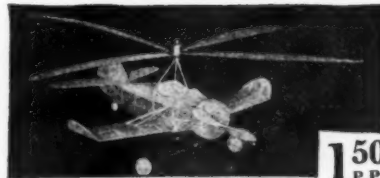
Ribs, bulkheads, fairings, and other parts clearly printed on balsa wood.—3 finished, turned balsa cowlings ready to be attached to plane.—Finished, turned, complete balsa wheels with bushings.—Ready-shaped propeller.—Semi-finished hollowed out pants.—Letters for top and bottom of wing and rudder, ready cut out and gummed.—All wire fittings ready formed.—1 oz. balsa oil and colorless cement, and special colored dopes.—2 large sheets fine tissue (dark green and white)—Bamboo, rubber motor, and all other balsa strips cut to size.—Full size plans and constructing details.



2 FT. MONOCOUE

The model that boys want. A true-to-scale flying model of the famous plane. Kit contains everything for a complete Monocoupe (essential parts printed on balsa), full size plans and instructions.

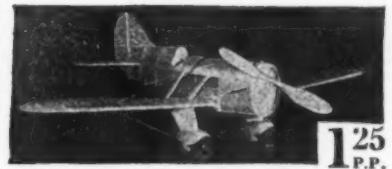
**125**  
P.P.



2 FT. KELLETT AUTOGIRO

This Kellett Autogiro is one of America's most popular models. It works on the same principle as the original ship. Complete with everything (all ribs, wingtips, bulkheads, etc., stamped on sheet balsa). Full size plans and instructions.

**150**  
P.P.



2 FT. GEE-BEE SPORTSTER

A winner for sturdiness and balance. Flies beautifully. Complete with full size plans (necessary parts clearly printed on balsa), and everything to build a perfect Gee-Bee.

**125**  
P.P.

## • • • WORLD'S HIGHEST GRADE MATERIALS • • •

ALL KITS and SUPPLIES GUARANTEED AS REPRESENTED OR MONEY REFUNDED

36" Scientific Balsa	36" Sheet Balsa
1/16x1/16... .01	1/32 x 2... .04
1/16x1/8... .01	1/32 x 3... .05
1/16x1/16... .01	1/16 x 3... .05
1/16x1/4... .01	1/16 x 4... .05
1/16x1/2... .01	1/8 x 3... .06
3/32x1/32... .01	1/8 x 4... .06
1/8 x1/8... .01	1/4 x 2... .10
1/8 x1/16... .01	1/4 x 3... .10
1/8 x1/4... .02	1/4 x 4... .10
1/8 x1/2... .02	1/2 x 2 x 18"... .02
3/16x1... .05	3/8 x 1/2 x 5... .01
7/16x1/16... .02	1/2 x 3/4 x 5... .01
3/16x1/4... .02	1/2 x 5/8 x 6... .01
3/16x1... .06	1/2 x 5/8 x 6... .01
1/4 x1/4... .03	3/4 x 1 1/4 x 11... .07
1/4 x1/2... .04	1 x 1 1/4 x 12... .08
1/4 x1... .06	1 x 1 1/4 x 12... .09
1/2 x1/2... .08	1 x 1 1/4 x 16... .11
1 x1... .17	

### Light Celluloid Wheels

Complete with bushings.

red, green, yellow, white,

blue, black,

1" diam. ....pair .06

1 1/2" diam. ....pair .08

1 3/4" diam. ....pair .10

2" diam. ....pair .16

3" diam. ....pair .35

### Balsa Wood Wheels

Balloon type with bushing.

1" diam. ....pair .05

1 1/2" diam. ....pair .06

1 3/4" diam. ....pair .07

### Atone

2 oz. can 10c 4 oz. 16c

plnt. 70c

### Clear or Colored Dope

Colors: Orange, red,

green, silver, yellow, buff,

black, grey, white, navy,

mahogany, olive drab.

2 oz. 12c 4 oz. 25c; pt. 85c

### Banana Oil

2 oz. 10c 4 oz. 18c; pt. 70c

### Colorless Cement

2 oz. 16c 4 oz. 25c; pt. 95c

### N.A.C.A. Celluloid

Cowling

1 1/2" diam. ....20

2 1/2" diam. ....22

### Aluminum Cowlings

N.A.C.A. and Open Face

1 1/2" diam. ....16

2 1/2" diam. ....18

3 1/2" diam. ....22

4 1/2" diam. ....27

5 1/2" diam. ....30

6 1/2" diam. ....35

### Dummy Radial Engines

Black celluloid, 9 cylinders

1 1/2" diam. ....19

2 1/2" diam. ....24

3 1/2" diam. ....29

### Scientific Endurance Brown Rubber

Careful tests on special rubber testing machines

show this endurance brown rubber to have 30% more

energy per unit weight than any other rubber on

the market. (All 1/32" thick)

1/32" sq. ....3 ft. for 1c, 225 ft. skein... \$ .70

1/16" flat. ....2 ft. for 1c, 225 ft. skein... .30

3/32" flat. ....2 ft. for 1c, 225 ft. skein... .30

1/8" flat. ....2 ft. for 1c, 225 ft. skein... .90

5/32" flat. ....2 ft. for 1c, 225 ft. skein... .90

3/16" flat. ....3 ft. for 2c, 225 ft. skein... 1.15

### HOW TO ORDER SUPPLIES

Orders under 25c not accepted.

Add 15c for packing and postage on all supply

orders up to \$1.50. Over \$1.50 add 10% (orders

west of Mississippi add 10c extra).

On Canadian and foreign orders up to \$1.50 add

25c. Over \$1.50 add 15%.

FREE! Complete Price List. Send 3c. to cover postage.

SCIENTIFIC KITS AND SUPPLIES ON SALE AT LEADING DEPT. AND TOY STORES

## SCIENTIFIC MODEL AIRPLANE CO.,

277 HALSEY STREET

(Dept. N-10)

NEWARK, N. J.

World's Largest Manufacturers of Model Airplane Kits and Supplies Exclusively



Scientific Double Geared Winders New, large size.

**50c**

### 15" FLYING SCALE MODELS

SE 5 British Pursuit-Fokker Triplane—Spad—Lockheed Vega. Most complete kits, including full size plans and detailed instructions. Easy to build. Guaranteed to fly. Postpaid

**99c** Each



American Beauty 359 Winders with automatic counters attached completely. Winder without counter 55c



UNIVERSAL



Vol. VII

No. 4

Edited by Charles Hampson Grant

## CONTENTS

OCTOBER — 1932

A PIONEER MAKES GOOD.....By Orville H. Knead	4
THE GEE BEE NR-2100 RACER.....	
By Avrum Zier	6
"WHATS" AND "WHAT NOTS" of MODEL PLANE BUILDING .....	
By Howard McEntee	7
HOW WELL DO YOU KNOW YOUR AIRPLANES?	9
BUILD A WAR TIME SOPWITH DOLPHIN.....	
By Robert V. Smith	10
BELGIUM'S GREATEST ACE .....	
By F. Conde Ott	21
BUILD THE WORLD'S FASTEST PURSUIT PLANE....	
By Robert Morrison	22
AIR-WAYS—HERE AND THERE .....	28
THE ITALIAN ANSALDO S.V.A. FIGHTER.....	
By Stockton Ferris, Jr.	32
AVIATION ADVISORY BOARD .....	33
THE AERODYNAMIC DESIGN OF THE MODEL PLANE .....	
By Charles Hampson Grant	34

### In Our Next Issue

#### The Autogiro

The second instalment of A Pioneer Makes Good by Orville H. Kneen, completes the story of how Cierva developed the autogiro into a successful flying machine.

#### Noted War Plane

Build the Friedrichshafen G II, War Time Bomber. Robert V. Smith gives you complete instructions and plans to create for yourself in model form, the greatest bombing plane of the World War.

#### Novel Glider Launching Device

How to Launch Your Glider From a Kite, by Lieut. H. A. Reynolds, provides you with much data that will enable you to enjoy a novel and interesting pastime.

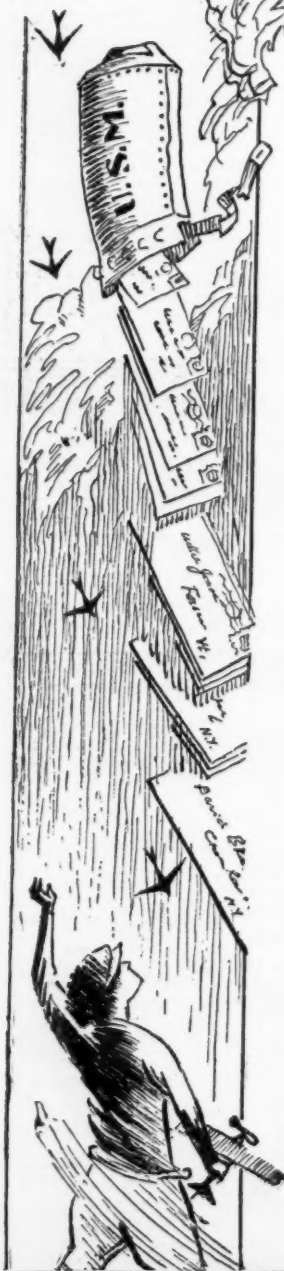
The Three-View Drawings by Stockton Ferris, Jr.; a War Ace Story, by Lt. (j.g.) Miller; the Aerodynamic Design of the Model Plane, by Charles Hampson Grant, and other interesting features help to make the November issue of UNIVERSAL MODEL AIRPLANE NEWS a necessity for air-minded young men from ten to seventy years of age.

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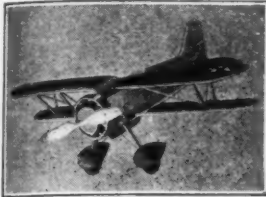
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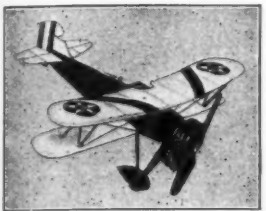


**BRITISH HAWKER FURY**

A modern English fighter of the British Royal Air Force. This ship is credited with a speed exceeding 200 m.p.h. National's 12" midget model is an excellent replica, and a very good flyer. Colors: White, black trim with British insignia. Kit complete. **100**  
Blueprint only ..... 25c

**CURTISS F-9C-2****THE AKRON FIGHTER**

Five of these small fighters are carried aboard and flown from the Akron. National was the first to offer this most interesting ship in perfect miniature. 12" Midget kit complete with detailed blueprint and instructions. Kit complete. **100**  
Blueprint only ..... 25c

**CURTISS HELL-DIVER**

One of the most famous ships to be sponsored by the Navy. 12" Midget kit complete with detailed blueprint and instructions. Kit complete. **100**  
Blueprint only ..... 25c

**FOKKER D-VIII**

A German war-time model, developed and flown during the closing days of the war. National Midget is a perfect miniature of this famous war plane. Easy to build and an excellent flying model. 12" construction kit complete with detailed blueprint and instructions. Kit complete. **100**  
Blueprint only ..... 25c

**AGENTS WANTED**

We want one dealer or agent in every town to handle National Model Airplane sets and supplies. Because of their proven quality, a National model dealer with sets and parts to supply immediate wants, can build an interesting and profitable business. Write for full details.

**HOW TO ORDER**

Write or print plainly full name and address.  
For packing and postage add 15c to cost of merchandise on all orders up to \$1.50—over \$1.50 add 10c. Remit by P. O. or Express Money order, or Check. We insure all shipments without cost to you.

# NATIONAL Construction Kits

are known from coast to coast  
for **QUALITY—ACCURATE DETAIL**  
and **FLYING PERFORMANCE**

All National kits are accurately designed for you to build perfect miniatures of the big ships. All balsa wood is cut to dimension, some shaped, stations, ribs, and prop blades printed, making it easy to cut out. All coverings and insignia are of correct colors—formed wire parts, wheels, cowlings, pants, everything to build a perfect model—a genuine blueprint full size, completely detailed with instructions to guide you is packed with each kit. All National models are offered you at new low prices—consistent with quality. Each kit is guaranteed as represented or money refunded.

## NATIONAL'S 1932 MODEL BUILDING FLEET CONTEST \$160.00 in CASH AND OTHER VALUABLE PRIZES

Have you received your broadsides with full information and entry blank? Contest opened Sept. 1st. Closing date Dec. 1st—12 o'clock midnight. Awards to be made and announced on Dec. 15th, 1932.

**OTHER NATIONAL KITS****MIDGET 12" MODELS**  
\$1.00 each plus 10c postage

Curtiss Hawk  
Heath Parasol  
Fokker D-7  
British S.E. 5  
Curtiss Falcon  
Nieuport  
Spad  
Albatross  
Fokker Triplane  
Boeing P-12E

Texaco 13  
Bellanca  
Sikorsky S-32  
Lockhead Sirius  
Pitts Scout  
Sopwith Camel  
Gee-Bee Sportster  
Laird 400  
Polish P-8  
Lockhead Vega

Any midget blueprint ..... 25c  
Any midget model ready to fly ..... 4.40

**JUNIOR 18" MODELS**

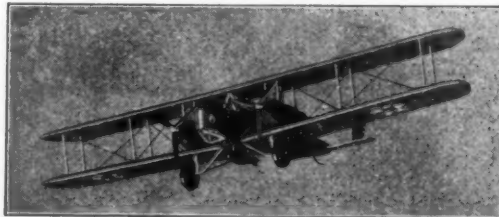
\$1.50 each plus 15c postage

Curtiss Condor Bomber  
New Boeing F-4B-3  
British Supermarine  
Any Junior Blueprint ..... 35c  
Any Jun.-or ready to fly ..... 7.70

**SENIOR 24" MODELS**

\$2.00 each plus 20c postage

Curtiss Hawk  
Spad  
British S.E. 5  
Nieuport Scout  
Fokker D-7  
Fokker Triplane  
Albatross  
Boeing P-12  
Any Senior Blueprint ..... 50c  
Any 24" model ready to fly ..... 12.00

**CURTISS CONDOR BOMBER**

A well known army bombing plane. National's 18" Junior model construction kit complete in detail, makes an unusual miniature model. **150**  
Price ..... 35 cents  
Blueprint ..... 35 cents

**NATIONAL QUALITY SUPPLIES****CELLULOID MOTORS**

1 1/2" diam. .... 20c  
2" diam. .... 25c  
3" diam. .... 30c

**BALSA STRIPS**

1/16 x 1/16 x 36. .... 12 for 10c

1/16 x 1/8 x 36. .... 12 for 10c

1/8 sq. x 36. .... 12 for 10c

**CELLULOID WHEELS**

1/4" diam. .... per pr. 6c

1" diam. .... per pr. 8c

1 1/2" diam. .... per pr. 12c

1 3/4" diam. .... per pr. 20c

**CELLULOID PANTS**

with wheels for Midget model. .... 35c

for 24" model. .... 30c

**JAPANESE TISSUE**

White 20x24 ..... 2 for 5c

Colored

Yellow, orange, red, green, olive, blue, and black.

Each ..... 5c

1/32 x 1 x 36. .... each 3c

1/32 x 2 x 36. .... each 6c

1/16 x 2 x 36. .... each 8c

1/16 x 2 x 36. .... each 12c

1/8 x 2 x 36. .... each 12c

**FULL STRENGTH CEMENT**

1/4 oz. .... 8c

1 oz. .... 15c

2 oz. .... 25c

**BANANA OIL UNCUT**

1/2 oz. .... 7c

1 oz. .... 13c

2 oz. .... 20c

**ARMY AIR CORPS**

18 different designs, per sheet ..... 10c

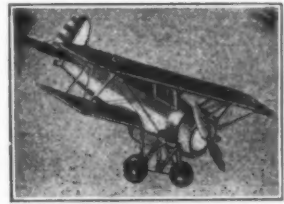
**CAMOUFLAGED TISSUE**

7 x 12, per sheet. .... 10c

**CHECKERED TISSUE**

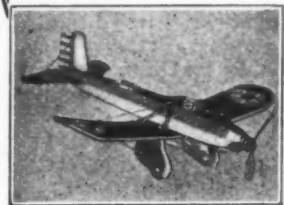
7 x 12, per sheet. .... 5c

Colors: Yellow, orange, red, green, blue and black on white, black on red, or black on orange.

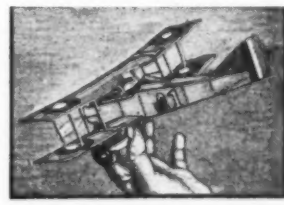
**NEW 1932 BOEING**

P-12E AND F-4B-3

The army scrapper rated the fastest pursuit plane in the world, and its Navy twin, the fastest war bird. 18" combination kit with complete blueprints to build both models. Kit complete. **250**  
Blueprints only ..... 4c

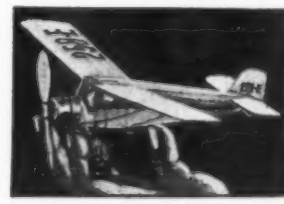
**CURTISS A-8 ATTACK**  
**THE TERROR OF THE SKIES**

The 18" construction kit complete with full size, detailed blueprint, makes a splendid replica and excellent flying model. Kit complete. **150**  
Blueprint only ..... 35c

**SPAD**

No war-time model gained greater fame than this French built plane flown by Capt. Rickenbacker. National models of this famous plane are complete to the smallest detail and proven flyers.

12" Midget Kit (pictured) **\$1.00**  
24" Senior Kit ..... **2.00**

**CURTISS ROBIN**

A well known cabin plane and one of the entries in the 1932 Trans-Continental Sweepstakes. National Midget model is an excellent miniature in design and has great flying ability. Kit complete. **100**  
Blueprint only ..... 25c

**1932 New Catalogue "F"**

The largest and most completely illustrated catalogue of model airplanes and supplies ever offered. Also contains helpful construction suggestions and one 12" full size blueprint.

Send for your copy today, price... **10c**

**FREE!**

National monthly bulletin supplements the general catalogue, check full of current news—features new models and supplies. Write for your free copy today.

(Dept. A-29) Blue Bird Bldg.  
NEW ROCHELLE, N. Y.

**NATIONAL MODEL AIRCRAFT & SUPPLY CO.**

# A Pioneer Makes Good

## The Little Known Facts of Cierva's Struggle to Produce a Safe Flying Machine and How These Resulted in the Birth of the Autogiro

By Orville H. Kneen

**I**MAGINE ourselves in neutral Spain during the last hectic summer of the great war—A queer place to pick up new ideas on airplanes, if that's what we're here for. Why? Because the army has almost no planes. Finally, being unable to buy any from the fighting nations, its chiefs have decided on a grand competition.

Big prizes are offered for the best design of fighting, scouting and heavy bombing planes. Keen young aeronautical designers make their entries for the fighters and scouts, but the 50,000 *pesetas* offered for a heavy bomber has no takers. No one in Spain has even *seen* one, much less tried to design and build such a huge war-bird. It must carry deadly "eggs" weighing hundreds of pounds, and a crew as well.

Just in time a young student of the Civil Engineering School slides in his entry for the bomber. What would a civil engineer know about airplanes? More than you might think. During his six-year grind he had studied everything he could lay his eyes on that dealt with aircraft. And he knew how to design light structures to carry heavy loads and sudden stresses.

More important still, this 22-year-old burner of midnight oil knew how to "sell" an idea. He induced some friends to "pungle up" (French for "shell out") enough good Spanish *pesetas* to supplement his own and build the big ship he rapidly drew up on paper. He must have been a good salesman, for he had no ready-made, build-your-own plans, not even a picture of a bomber. No such ship as he designed had been built. He had to figure out every part—then convince his friends it would do the business, and hardest of all,—wait for the test.

Months of secrecy and whispering. The big day arrives. The bomber is ready to fly—maybe. The crowd gasps—what's a crowd without a gasp or two?—as the hangar doors swing wide open and a huge biplane is trundled out, an excited young en-

gineer giving a trundle or two himself.

The three big motors warm up in their usual turnover. Set as tractors, they aim to get up in the world with a pull instead of a push (a novel idea then, and one that works better with planes than with jobs). The crowd gets an eyeful as well as a couple of earfuls.

The motors spin, the great wings vibrate gently to the tips of their eighty-foot span. The designer likewise vibrates from stem to stern. His "rep" is at stake. The bomber is built to carry fourteen passengers, but there is no grand rush for places. "After you, my dear Alphonse," and they all decide politely to let the pilot launch 'er. The inventor is requested to keep both feet on the ground, but finds it difficult.

**T**O MAKE the rest of this long story into a short—"short" with a sad ending, the pilot took 'er up and she responded nobly. She flew like a bird and a half. Soon the pilot was sure he had her eating out of his hand, though he'd never steered such a big one before. Finding her docile, he started getting familiar. With the usual result.

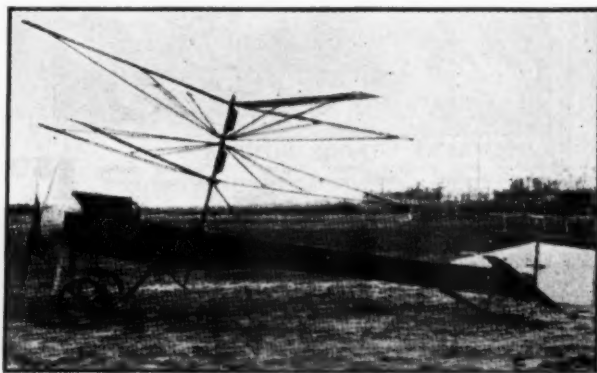
Flying low one day, he started to make a sharp turn in high, as many another low, reckless driver has tried. The ground came up and smacked him down. They fished the pilot out—the only thing left in one piece—but Cierva was pretty badly shaken. No, he wasn't in the plane; they wouldn't let him go up, yet. But who wouldn't feel shaken, with his career smashed into kindling?

He did get the equivalent of \$10,000 as the prize winner. But unluckily he and his friends had already dug up \$32,000 to win it! It took no slide-rule to figure out how long the family pile would last at that rate. Evidently those stories about "riches taking wings" were no fairy tales. Designing airplanes which could smash up even before you could collect the first instalment



(Photograph by Bachrach)

Cierva, inventor of the Autogiro



Cierva's first experimental machine, in which rigid rotor vanes were mounted on an old Deperdussin fuselage. This proved to be failure number one. It "cracked up"

looked like no royal road to riches. More like the rocky road to Dublin!

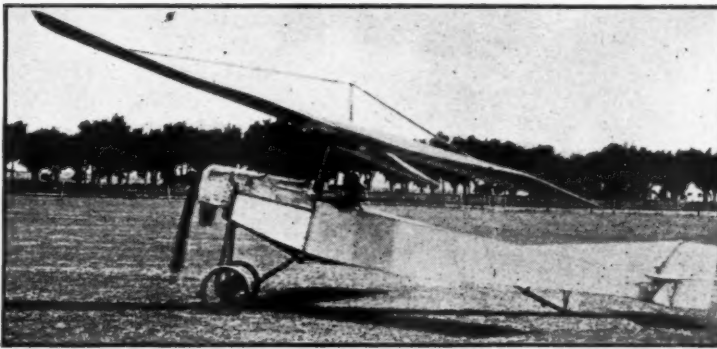
The young engineer took the pieces of that desiccated bomber and made them into an autogiro, did he not? Yes, he did not. But the wreck yielded him dozens of plain and fancy assorted ideas. It started him on a year of mulling, with a large turnover of mulls per day, and destined to have mighty important results.

The point was that he had designed and built a good ship—efficient, balanced, powerful. A good pilot had flown all over the sky. All was well as long as he flew high, wide and fast.

It looked all wrong to Cierva. Speed's all right when you're putting salt on birds' tails. But you've gotta come down sometime, if only for gas and chow. Now if you had a ship that could fly low and slowly, keep an even keel and live controls, let you pick a vacant lot with a gas pump alongside a hot-dog stand, and finally let you land and take off without injuring scenery or ship—then you'd have an aircraft that would be a regular flying motorcar!

His friends—he had many—patted him on his broad back and laughed at his pipe dreams. But Cierva had several jumps on aviating dreamers in general. He'd lived with planes since he was twelve. He was paper-gliding when the Wrights were putting cricks in people's necks and in world records, by flying ninety miles in two and a third hours. He knew why little helicopters, with rubber-band motor, could bore their way straight up but big machines couldn't carry enough power to do the same.

He knew, too, why all planes stay up—speed of air under and above the wings. No forward speed and you don't fly. Forty miles an hour—fast ships up to ninety—just to keep aloft! And that's pretty fast when you're trying for a landing, maybe in fog, haze or darkness!



Here is the second machine which also was equipped with rigid vanes and proved unsuccessful

as you slide swiftly along the air waves. When those waves cease going past your wings, you're sunk. He knew all that.

And he had had lots of bumps. To test their book-learning, he and two other young aviators had built gliders. Cierva had flown them. Then they had bought a fine airplane, that is, all that remained of one after the pilot had tried to land without killing the crowd that dashed onto the field. The kindly aeronaut had shown the boys how to build it anew, even to a prop whittled out of an old wine-soaked counter. Canvas, doped with glue, dyed red, made rattling good wings.

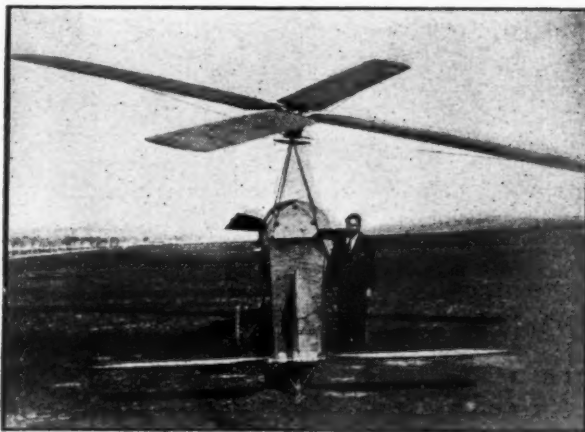
In fact, whenever she flew, the whole thing rattled and flapped like an ancient windmill. But fly she did, the aeronaut at the controls, and young Cierva perched in front, so thrilled he couldn't speak. Thus he got some early rides, until the rains came and the glue washed out!

Cierva and company had less luck with a fast monoplane they designed and built. It refused to rise to the occasion. Too little lift at take-off speed. The landing gear got weak in the knees.

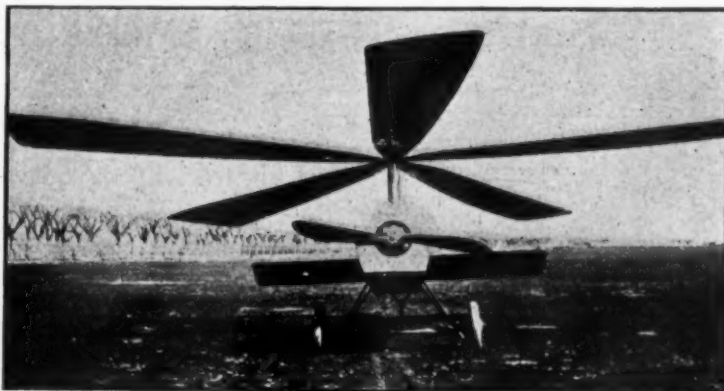
Pesetas ceased when parents padlocked their purses. Cierva went to the engineering school, kept up his aeronautics on the side—and after his brother had been laid away to rest, got ready to try out any new idea that popped into his large and well-oiled brain.

Luckily, there were no flying sharks around, to

(Continued on



Cierva's fourth unsuccessful attempt. Here he incorporated means to change the angle of attack of the rotor blades, as desired, while in flight



Cierva's fourth unsuccessful attempt. In this machine Cierva tested the

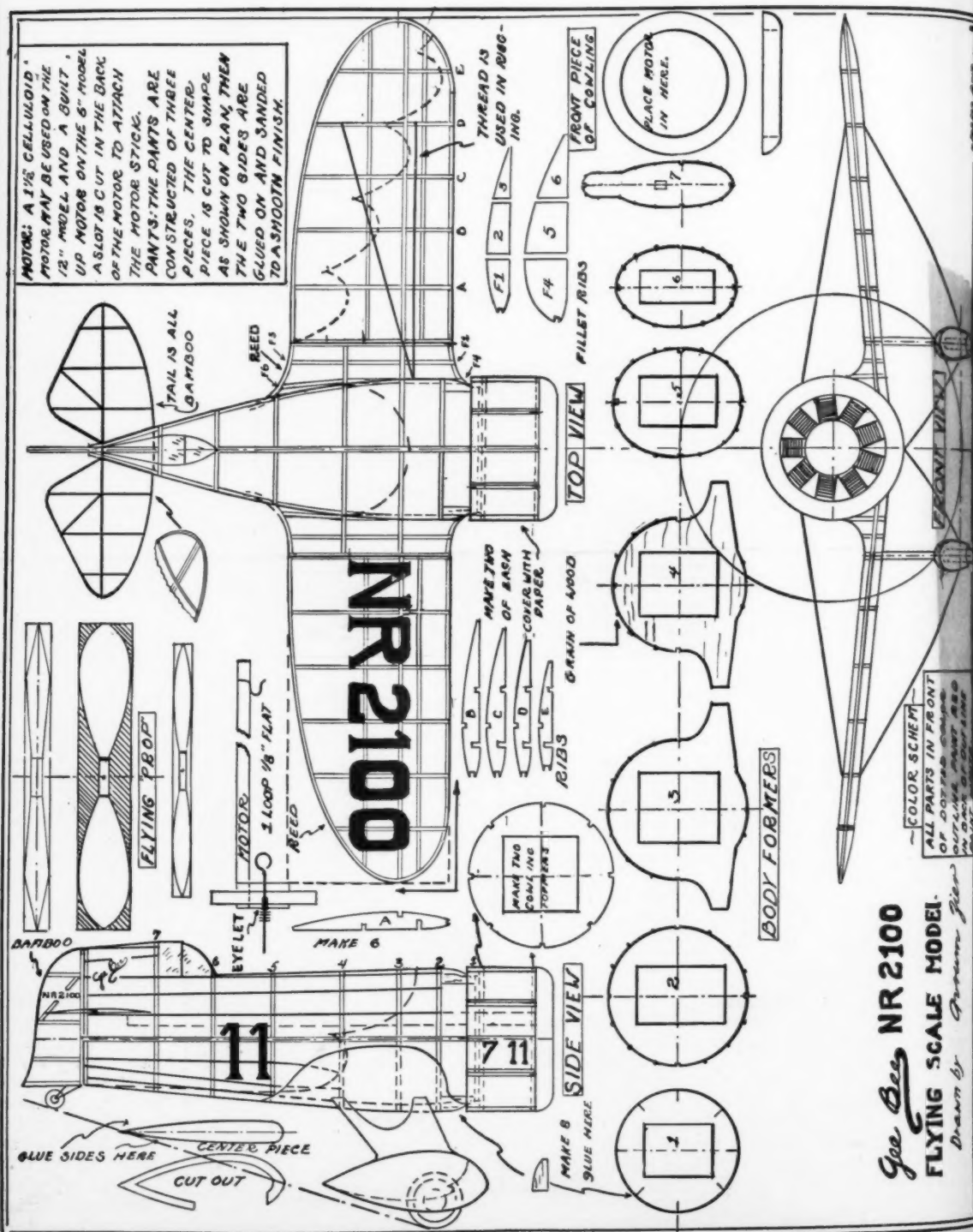


# THE GEE BEE NR-2100 RACER

Here is the little Gee Bee Racer recently flown by Boardman at Bowles Airport. It attains a speed of about 293 miles per hour and has proven to be the fastest land plane in the world. It is built around an 800 h.p. special P. & W. Wasp engine.

Special attention is called to the change in the shape of

the rudder, from that used in previous models. Also the position of the pilot's cockpit, well back and immediately in front of the vertical fin. Since this drawing was made, the rudder has been enlarged by increasing the height of it about twelve inches. This change decreases the tendency to spin and increases the directional stability.



***Goa Bees* NR 2100**

**FLYING SCALE MODEL.**  
*Drawn by Vernon Rice*

Drawn by Proctor Fien

Also not  
and immed  
drawing w  
the height  
es the res  
lity.

FRONT VIEW

Wings cause  
the plane to  
turn and  
roll.

Drawn by  
Gordon Glen

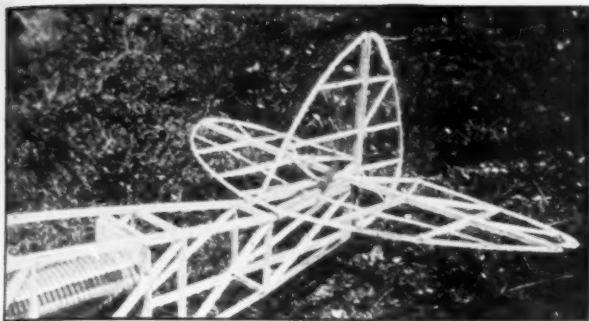


Fig. 4.—Tail surfaces of a sixty-inch compressed air model, with movable rudder and elevators

# “WHATS” AND “WHAT NOTS” OF MODEL PLANE BUILDING

## Practical Systems of Construction For Tail Surfaces and Wings

By Howard G. McEntee

**T**HE tail surfaces of model airplanes may be made of many different materials. A few of these are balsa, bamboo and wire. Balsa is light and easy to use, but if the outline of the tail is not rectangular, many separate pieces are needed to get the proper shape. Also, the finished tail cannot be changed to alter the performance, as, for example, bending the rudder to cause a circle, for the wood is too brittle. Therefore, if this adjustable feature is desired, the rudder and elevators must be separate and hinged to the fin and stabilizers. This sort of construction adds realism, but it also adds considerable weight.

On very small models, thin sheet balsa may be used for the tail surfaces. For a one-foot model  $1/32$ " thick sheet is about right. Of course, care must be used to select very light wood for such a purpose. Beginners can make correctly shaped tail surfaces this way, whereas other types would be very difficult. The grain of such tail surfaces must run outward from the fuselage, that is, at right angles to the center line. Very thin bamboo pieces glued on across the grain will give the necessary stiffness, if the wood seems too weak.

The wire type of tail surface is not used much in this country although the English model builders use such construction almost exclusively. The outline of the tail plane is bent from one continuous piece, after which the necessary ribs are installed usually by soldering. Music wire is used throughout and such construction is practically unbreakable, which seems to be its great advantage, as the weight is much greater than we can use on our feather-weight balsa ships. The writer, therefore, advises all but the experienced builder to leave wire construction alone.

Bamboo construction is about the best we have as it is a compromise of the strength of wire and the light weight of balsa. The bamboo tail, unlike built-up wood, can be bent somewhat to adjust for performance, so that it is unnecessary to add weight and complicate the model with separate control surfaces. The edge or outline is made in two pieces.

Since both sides should be alike, one half of the outline is bent and then the piece is split so that after slight trimming you will have two halves exactly the same. If the design of the model is such that the horizontal tail is all in one piece, place the two halves on a flat board and glue them together at the center. At the same time install any spars and ribs needed, the latter also being made of split bamboo. In some cases the model is so designed that the rubber or the motor stick is in the way of the tail outline. In such cases the outline must terminate at the sides of the fuselage and cannot go through. The main spar of the tail is first glued in place and cut to length. Then the two outline pieces are glued on and last of all the necessary ribs are installed. This procedure is always followed on a hollowed-out balsa fuselage because we do not wish to cut long slots in the latter for the tail to slide in.

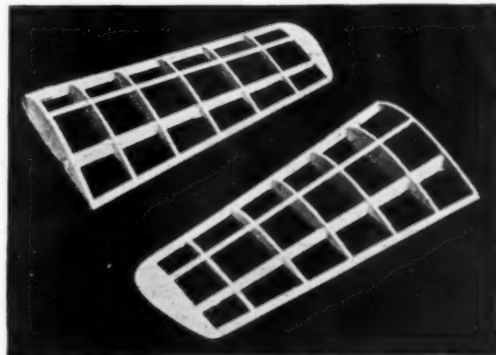
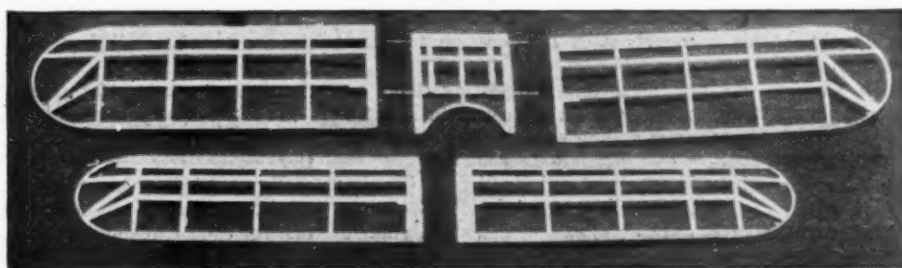


Fig. 10. This picture shows wings for a Boeing Bomber Model, with tips made from balsa blocks

The all-bamboo type rudder is built onto the model, as described for the tail where the spar is glued in place first. When the fuselage is made, the rudder post is usually put on last. When ready to finish the rudder, cut the post to the proper height and glue the outline in place. When dry the necessary ribs may be put in place.

**W**E NOW come to some general considerations of tail planes. First, for models up to about two foot spread the tail is usually made thin and flat. In the case of bamboo, the thickness will be about  $1/32$ ", while the



Here the construction of a complete set of wings for a Nieuport No. 28 is clearly shown

built-up balsa style will be between  $1/16"$  and  $1/8"$  thick for the size model mentioned. If you wish, you may give your tail surfaces a streamline section, similar in shape to the top of a wing rib, but, of course, the same curve on top and bottom. For a two-foot model the maximum thickness should be no more than about  $3/16"$ . When you build such tail surfaces, you will have to use more ribs than for the flat type of tail, in order to keep the covering held out in the proper shape. Such tail surfaces should, of course, be covered on both sides. The flat bamboo type, however, is often covered on one side only, the top for the elevators and one side of the rudder, especially if you wish to save weight.

Right here we shall consider weight on the tail of a model. Fig. 1 will serve to illustrate. Suppose, due to heavy construction, we build the tail surfaces  $1/2$  oz. heavier than necessary. The tail is distance B from the center of gravity and B is just three times as far as distance A. Therefore, we must add  $1 1/2$  oz. at the nose to balance the model. Thus our ship is 2 oz. overweight due to a  $1/2$  oz. too heavy tail. Therefore, consider twice before adding such "luxuries" as movable

controls, tail wheels, etc., to flying models.

For hinges on models the simplest scheme is to use soft iron wire as shown in Fig. 2. For a two-foot model, three pieces of No. 20 B. and S. gauge wire will be sufficient. Place one in the middle and one at each tip. Fig. 3 shows a cross section or end view, the wire being bent as shown and the two ends forced into the wood and well glued. All hinges should be put on the top, and of course a space of  $1/16"$  or so left between so the elevators may be bent downward.

The rudder may be hinged the same way, although it will look better if the center rudder hinge is pushed through the middle of the wood and glued instead of being glued on one side. The top and bottom hinges are also glued at the very top and bottom in the center. Thus the rudder may swing evenly to either side. With this wire system for hinging, no means for holding the movable surface in a certain position is needed as the wire is stiff enough to do this, although it is soft enough to bend readily.

Tail surfaces do not need any supporting struts or thread although these may be put on with very little extra weight if the constructor is scaling down a large ship.

ON large models such as compressed air fliers, it is quite an advantage to have movable controls. Fig. 4 shows the tail surfaces of a compressed air model. The rudder and elevators are movable. The hinges are made of  $1/4"$  lengths of  $1/16"$  O. D. aluminum tubing glued at intervals to both stabilizer spar and elevator spar. A piece of music wire runs through all the tube pieces, from one tip to the other, thus forming the "pin" upon which all the

hinges turn. This scheme is similar to that used on large ships, an example of which is the Curtiss Robin.

We shall now take up the subject of wings. Before going into this, however, the reader must be reminded that there are dozens of different types of wing and many more types of construction. Obviously, it is beyond the scope of this series to describe all these in detail. Therefore, only the most important will be taken up. To begin with, wings may be divided into two main classes: the straight wing and the tapered wing. The arrangement of the wings, bi-plane, high wing, low wing, etc., we shall take up later.

The straight wing is one in which the majority of the ribs are equal in curve and length. There may be one or two at the tips which are not so deep or a bit shorter; all but these are alike. They may, therefore, all be cut from the same form, the tip ribs being sanded down later if they are different.

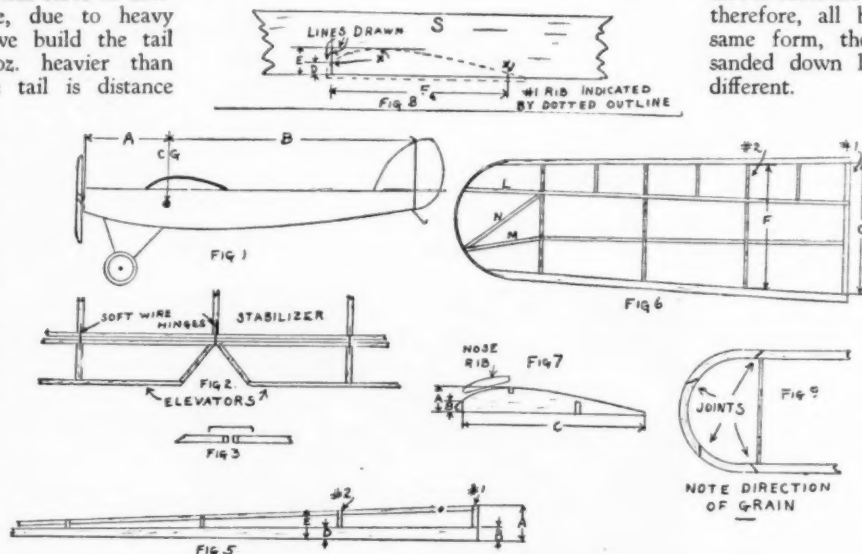
The writer is strongly in favor of using the leading edge of the wing as one of the main wing spars. The reason for this is that the spar can take a much heavier blow from hitting some obstacle in flight than can the thin leading edge sometimes used. Also the construction is

simplified as only one other main spar is needed besides a trailing edge and a top spar. The latter is extremely important to good looks in a model as it prevents the wing from warping lengthwise. This is because a sort of box spar is formed which greatly increases the strength of the wing. It is not necessary to make the top spar very heavy,  $1/8 \times 1/16"$  being ample for a two-foot span, with the spar being set vertically. The rear spar is placed on the bottom of the wing about two-thirds to three-quarters back from the leading edge. The size may vary but for a two-foot model the maximum should be about  $1/4 \times 1/8"$ . The front spar and leading edge may be the same and put on with the widest edge vertical as was the rear spar. However the front spar should be cut and rounded so that it forms the front part of the wing curve, which curve is continued by the ribs. The piece may be roughly cut before assembly, then it can easily be shaped completely after the wing has been assembled. The trailing edge of a wing the size we have been discussing may be of  $1/8 \times 1/16"$  balsa and for a finished job it may be sanded to a wedge shape, the thin edge being to the rear.

The top spar mentioned before must be placed at the highest point in the wing curve in order to be most effective.

Tapered wings are a little harder to make as the ribs all differ, although, of course, two of each shape are made, one for each wing.

Figs. 5, 6 and 7 show a simple way to figure your own set of tapered ribs. No. 1 rib is any which you have chosen and we assume it to be the largest one, that is, the rib next to the fuselage. As we know, the front and rear spars must be tapered, usually being (Continued on page 38)





# How Well Do You Know Your Airplanes?

What Are the Names of the Airplanes Silhouetted on this Page?

The following awards will be paid by UNIVERSAL MODEL AIRPLANE NEWS to the persons whose letters, in the opinions of the judges, show the greatest evidence of accuracy, neatness and attention to detail. The winners will be judged by Mr. Charles H. Grant, Editor of UNIVERSAL MODEL AIRPLANE NEWS, and Mr. Stockton Ferris, Jr.

Award for First Place, \$5.00; award for Second Place, \$3.00; award for Third Place, \$2.00.

In the event of two or more persons



being tied for the first, second or third awards, both persons will be paid the award.

All entries to be eligible for these awards, must be received not later than October 20th, 1932. Address all answers to Silhouette Award, care UNIVERSAL MODEL AIRPLANE NEWS, 125 West 45th Street, New York City.

Get busy, sharpen your wits, and see how good you are. This contest will increase your aviation knowledge which will be a constant source of pleasure to you.

## Here Are the Answers to the August Contest

**W**ELL, well, well, believe it or not, here we have the answers and the winners of the August "How Well Do You Know Your Airplanes" contest.

As usual, boys from all over the country have sent in their answers to this great contest, which has proven to be very popular indeed. Unquestionably before this series of silhouettes of airplanes has been completed, our young readers will have had a complete education in the various types of aircraft in use at the present time. In fact, this is one of the purposes of the contest.

Now for the sad news.

The names of the planes that appear in the August issue are as follows:

1. Boeing Monomail—Hornet engine (Pratt & Whitney).
2. DeHaviland 5 (war-time)—LeRhône 110 h. p. engine.
3. Curtiss 01G (Falcon)—Prestone Conqueror engine.
4. Handley-Page Hannibal—Four Bristol "Jupiter" 450-500 h. p. engines.
5. Curtiss 02C-1 (Hell-Diver)—Wasp engine (P. & W.) 500 h. p. engines.
6. Dewoitine D.33—Hispano-Suiza 650 h. p. engine.

7. Great Lakes Sport Trainer—Cirrus 90 h. p. engine.
8. Fokker XO-27 Observation—Two Prestone Conquerors.
9. Consolidated Fleet Trainer—Kinner 125 h.p. engine.
10. Curtiss AT-5—Wright J-5 220 h. p. engine.
11. Fokker D. VII—Mercedes 180-220 h. p. engine.
12. Bristol Bulldog—Jupiter engine.
13. General Mailplane—Wasp engine.
14. DeHaviland Moth—Gypsy 90 h. p. engine.
15. Barling Bomber—Six Libertys, 400-450 h. p. each.

A good many answers to the August contest were correct. However, some merely listed the planes and gave no details. The prizes were awarded to the three boys whose answers were correct and who gave the greatest amount of correct information about these ships, in neat form.

The winner of the first award of \$5.00 is Mr. William A. Wooding of 53 Marion Street, Brookline, Mass. His answers were not only all correct but showed great knowledge concerning details of the ships themselves.

The winner of the second award of \$3.00 is Mr. Wesley J. Cook of 711 East New Hampshire Avenue, Hawthorne, Calif. Mr. Cook made a very complete chart which showed the names, the perform- (Continued on page 38)

# Build a War-Time Sopwith Dolphin

Complete Instructions and Plans to Build a Carefully Designed Flying Scale Model of One of the Finest Pursuit Ships of the World War

By Robert Vail Smith

**T**HE Sopwith "Dolphin," although not so well known as some of the many other aeroplanes, put up a very creditable performance in the World War. It presented a formidable appearance due to the negative stagger of the wings and the lessened gap between them. The "Dolphins" were especially well adapted for the installation of the 200 and 300 horsepower Hispano-Suiza engines which had reached a productive and improved stage. Among many things which drove terror into the enemy, was the carrying of four machine guns. The pilot could fire twin Vickers guns, mounted over the engine, and also fire twin Lewis guns mounted on the leading tube spar of the upper wings. The "Dolphin" was somewhat larger than the general run of war-time single-seater pursuits because of the increased power. One of the most noticeable things about the "Dolphin" was the negative stagger of the wings. Other examples of the negative stagger are the DeH. No. 5 and a number of Breguet models. With this arrangement, the pilot had an excellent range of vision.

The "Dolphin" model showed remarkable characteristics in its flying, attaining good altitude and also covering long distances. The model described herein, weighing less than one ounce, takes off and lands remarkably well considering that it is a flying scale model.

A standard of  $\frac{3}{4}$  inch to the foot is a convenient scale to make models by, being a scale set forth by "The Cleveland Model Co." This "Dolphin," although modeled to a slightly smaller scale is built to scale.



Coming in after about fifty seconds

## Fuselage

A tracing of the side view of the fuselage from plates 3 and 4 will be found helpful. This tracing is laid on a board, preferably white pine, over which some wax

paper is laid so that the

glue will not stick to the drawing. The sides are now made using  $\frac{3}{32}$  inch square medium balsa for longerons and  $\frac{1}{16}$  inch square stock for the uprights. The sides of the fuselage at the front are made of  $\frac{1}{16}$  inch sheet balsa.



Gaining a little altitude for safety

The body sides should be dry by this time, and they are lifted from the jig. The sides are set upright and the cross pieces and formers glued in their positions.

**P**ROCEED slowly and carefully, thereby insuring a perfect fuselage. A piece of wood  $\frac{1}{6}$  inch square joins formers "E" and "I," and also a piece  $\frac{3}{32}$  inch square from "C" to "D." After the fuselage skeleton is completed, the nose-block "B" is put on next to "C" and the motor and cockpit cowlings are put in place. A small sheet of balsa is placed between the landing gear struts and also nose block "K" is put on for final assembly of the body. The framework photographs will be found helpful in constructing the model.

Because no motor stick is used, a rear hook of No. 14 (.033) music wire is made and placed in "J" as shown in Plate 9. A small dress snap on "A" and "B" will help the nose plug ("A") to hold the nose blocks together.

## Landing Gear

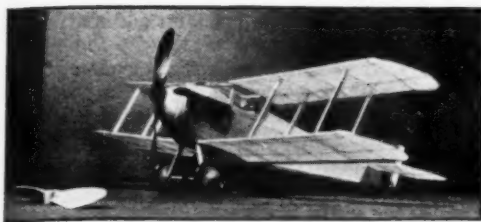
The landing gear is very simple to construct. A right and left set of "V" struts are necessary and are made of  $\frac{1}{8}$  inch hard balsa, see Plate 9 for details.

The spreader bar (axle) is a streamline piece of  $\frac{1}{8} \times \frac{3}{8}$  inch soft balsa. After these parts are done, the gear may be assembled and attached to the body.

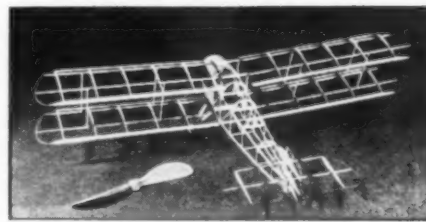
The wheels are of rather heavy stock so as to lower the centre of gravity. The wheels are  $1\frac{3}{4}$  inch diameter. No shock absorbers are used, only the wire axles. The hubs are small pieces of balsa cemented over the end of the axles. This completes the landing gear except for the optional thread bracings.



The Model Dolphin immediately after taking off



The finished framework ready for the covering  
Picture No. 1

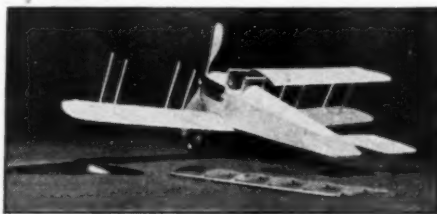


The completed model with surfaces covered but not doped  
Picture No. 3

### Tail and Rudder

The ribs may first be cut out of 1/64 sheet balsa for both the tail and rudder. The tail ribs may now be slipped

on the 1/16 inch square main spar. After these are in their respective positions and cemented there, the 1/16 inch square leading edge which is rounded is put in place. The tips of the tail spar are tapered as in Plate 7. The outline of the tail is made of a splint of 1/32 inch square bamboo bent to the correct shape by heating over a candle flame or a soldering iron.



The Model partially covered. Pict. No. 2

The rudder is built in much the same way as the tail. The rudder employs two spars, one of 1/32 x 1/8 inch balsa and the other of 1/16 inch square stock. The 1/32 inch square bamboo is carefully placed about the framework so as to conform with the shape on Plate 4.

This double surfaced empennage is both light and strong.

### Propellers

The flying propeller is the most important to make if one desires a flying model. A block which measures  $\frac{3}{8} \times 1\frac{1}{8} \times 7\frac{3}{4}$  inches is first procured and marked as in Plate 2. This block should be of a soft variety. The propeller is carved in the usual manner by cutting out the block as shown by the heavy lines. The blades are then carved. The hub or boss is left on only for looks, and maybe weight if the model needs it.

The scale propeller, if desired, is carved in much the same manner as the other propeller only, of course, it is painted and polished so as to resemble the real one. A shaft of No. 14 music wire is bent to the correct shape and then pushed through nose block "A" and plug, as in Plate 8. Three duralumin washers are slipped over the shaft. This metal is used as it is self oiling. The propeller is next placed on the shaft and the shaft is bent into the propeller as in Plate 9. The blades of either propeller should be from 1/16 near the hub to 1/32 inches in thickness at the tips.

### Wings

A total of twenty-four ribs are needed, twenty of which are cut from 1/32 inch balsa and four from 1/16 inch balsa. Soft material is best suited for this purpose. A template made of brass or tin will be found helpful in cutting the ribs. The main spars are 1/32 x 1/8 inch in size but the rear spars are longer than the front ones due to the rake of the tips. The leading edges are of 3/32 inch square balsa with front edges rounded. The trailing edges are of 1/16 x 1/4 inch medium balsa with their cross sec-

tion being triangular as in Plate 9. The tips are of 1/32 inch square bamboo bent to the correct shape. Remember that there are two left and two right wings and do not make the mistake of building them otherwise. The wings are built in much the same manner as the tail assemblies. One has to be extremely careful in constructing the wings so that they are perfectly level and not warped. The tips of the spars are tapered as seen in Plate 6. The bamboo tips (on plate) were left off for clearness.

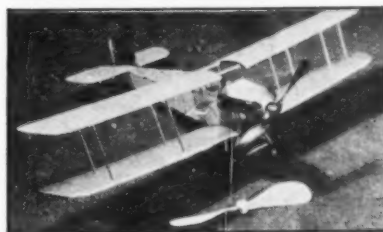
THERE is really no center section as common to most models, but a rather novel arrangement consisting of two tubes. These tubes are rolled from 1/64 inch soft sheet balsa around a 3/32 inch steel (aluminum, duralumin, brass) rod. The photographs and Plates 1, 3, and 7 will make this more clear. These are put on when the model is assembled.

The wing struts are now made, the large inter-plane struts are of 1/16 x 3/16 inch medium balsa while the short cabane struts are of 1/16 x 1/4 inch stock. All of the struts are carefully streamlined so as to lessen the resistance.

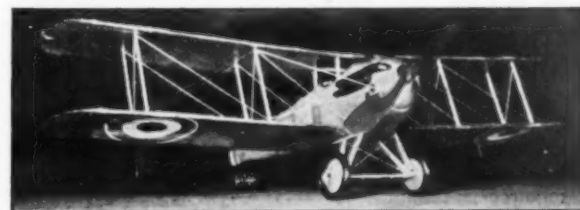
### Covering and Final Assembly

Two sheets of superfine tissue will be necessary for covering the "Dolphin."

The fuselage may first be covered. Start by covering the top or turtle deck, as it is sometimes called. The adhesive used is "banana oil." More than one piece of paper will be necessary for this as there are quite a few curves in the turtle deck. The paper can be trimmed by using a razor blade which is better than scissors. The sides may then be covered and the last section in the side, opposite the one diagonal, is left uncovered so that one has access to the rubber. Lastly the bot-



The undoped Model viewed from the front. Picture No. 4



Front view of the finished model. Pict. No. 6



Out on the tarmac ready for a night flight  
Picture No. 5



tom is covered and a place is left open for the tail skid arrangement which is seen on Plate 4. There are a number of ways in which to build the tail skid; the most desirable way is described on Plate 4.

The tail and rudder are next covered. The tips have to be covered with separate pieces of tissue because of the curves. Banana oil is again used for adhesion.

The wings are covered now, using one piece of tissue for each bottom and two pieces for each top (a separate piece for the tip).

One must decide upon a color scheme if any is to be used. The author's model had a blue fuselage, yellow wings and black and silver trimmings. These colors should be of a light dope and not lacquer (except for insignias). The colors can be sprayed on by the simple use of an ordinary atomizer, being careful to put on an even coat of the spraying mixture. This colored dope may also be brushed on, employing a small camel's hair brush. The model without any dope is shown in photographs 3 and 4.

After the parts are doped, the model may be assembled by placing the tail, rudder, and wings in their respective positions. The tail and rudder are glued on the fuselage as in Plate 4 and the photographs. The tail is set at zero angle incidence as is also the rudder.

**T**HE wings are now placed in position; the lower wings are glued on first. Plates 3 and 4 give the position of the wings. The proper amount of dihedral is given them and the struts are glued in place. Slits are cut in the paper over the spars at these places as in Plates 5, 7, and 8. Photograph 5 shows some detail in the mounting of the wings. The small or cabane struts are glued in place as in Plates 1, 3, and 7. The upper wings can now be cemented in place in the same manner as the lower wings only the root ribs are glued to the ends of the tubes instead of the body. The 1/16 inch ribs are used for all root ribs because strength is required at these points.

#### Miscellaneous Details

Of course the model as it now stands could be called

finished, but to really complete it, one must add some more detail as seen by the photographs of the finished reproduction. The cylinder or motor fairings are made of 1/64 inch balsa bent to a shape corresponding to the shape on Plate 1 and the photographs; the front and rear plugs are of soft balsa. The front streamlines are not glued to the nose block "B" but to nose block "A." The exhaust pipes are of tubular construction except for the pieces coming from the nose to the pipes, the tubes (pipes) are of 1/64 inch sheet balsa. The motor fairings and exhausts are painted black. A set of "Vickers" guns will add "looks" to

the model, these are made on the same order as the motor fairings. A small celluloid windshield may be placed over former "D" directly in front of the cockpit to give realism to the model. Small pictures or drawings of instruments may be put on former "D" to improve the interior of the cockpit. The radiators are both novel in appearance and light in weight. They are constructed by making balsa boxes, 3/8 inch square by 1 3/8 inch long. The tops and bottoms are of 1/8 inch stock while the sides are of 1/32 inch balsa. Instead of covering the fronts and

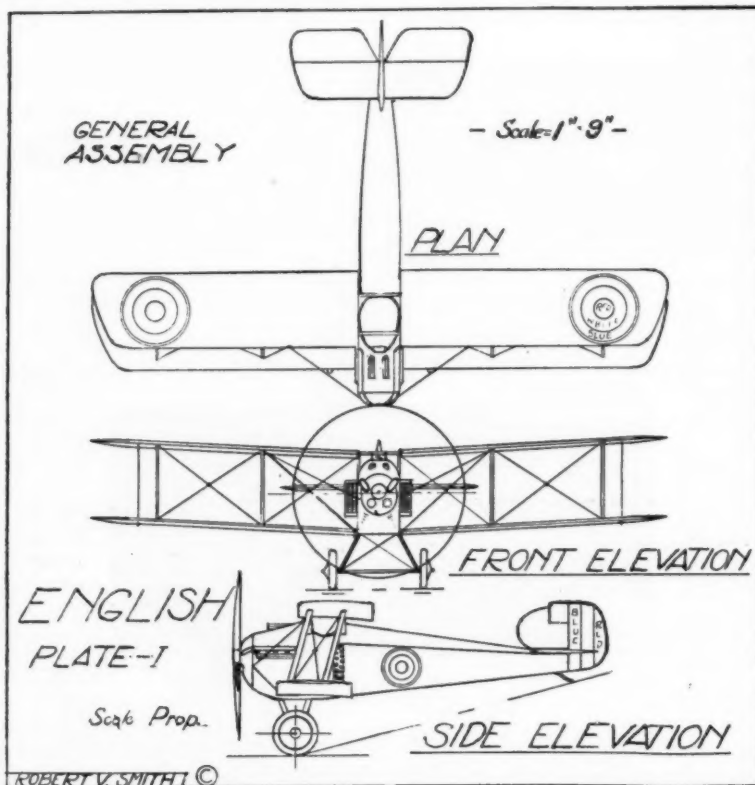
rears with wood, cloth is used, giving the appearance of mesh as in a real radiator. These boxes are glued to the fuselage at station "E" and may be painted black or silver as the builder desires.

Thread, representing flying and landing wires, always adds strength and beauty to a model if applied properly. A needle will come in handy for putting on the threads. Silk thread is used, being both light and strong.

The thread can be doped silver to represent real wire. The threads should be kept tight.

Insignia adds a touch of warlike realism to the model. English insignia is used in this case, the circles having red centers and the tail having a red trailing stripe. These insignias can be painted on, using lacquer, or stuck on, using company-made insignia. It is necessary to paint circles on the upper wings because paper ones will not shape properly over the ribs.

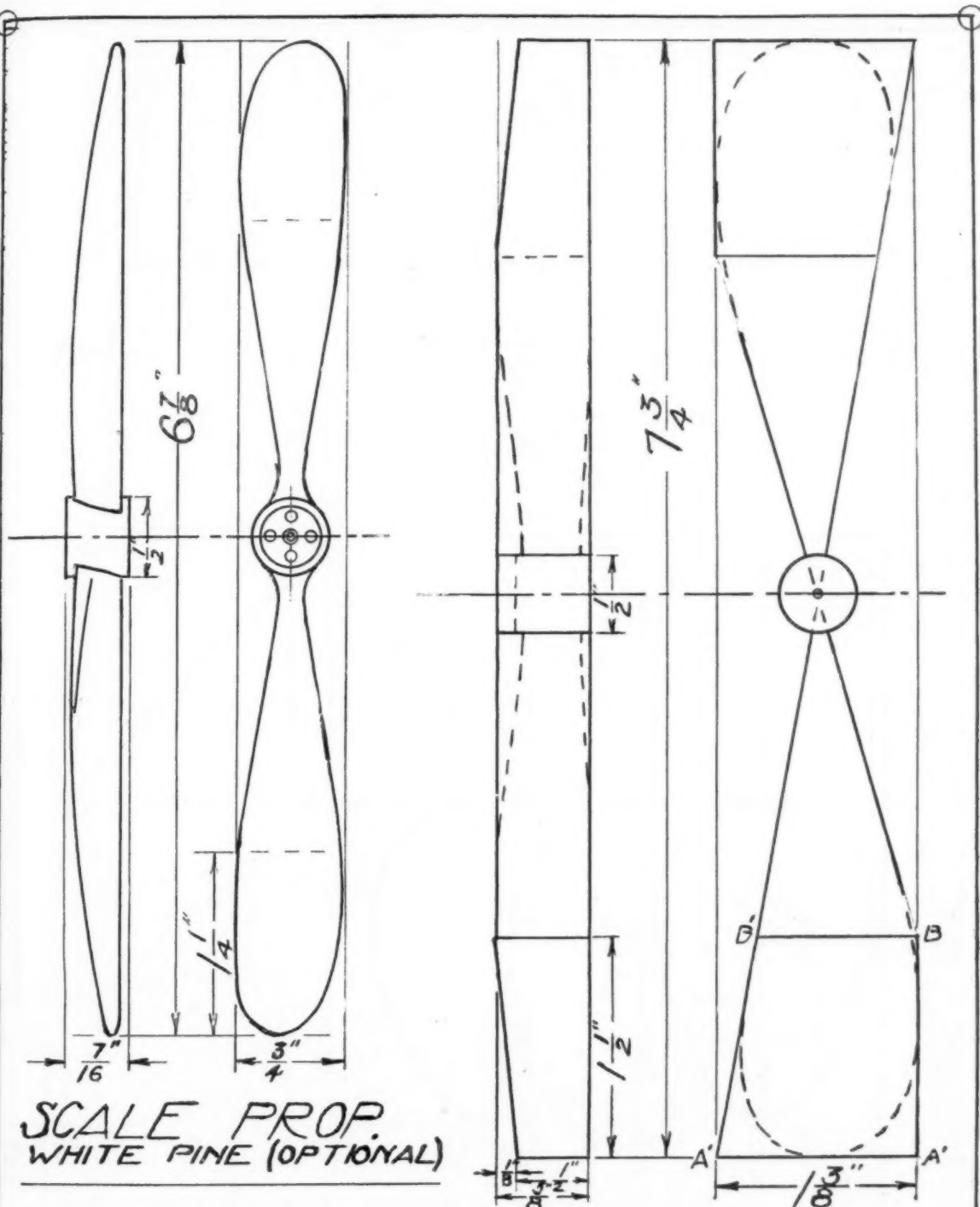
Thread bracings in the landing gear will help to strengthen it and also will be (Continued on page 43)



#### SOPWITH DOLPHIN CHARACTERISTICS OF LARGE MACHINE

Hispano Suiza Engine.....	200-300 H. P.
Gross weight .....	1,881 pounds
Range (cruising speed).....	230 miles
Speed at 6,500 feet altitude.....	131.5 M. P. H.
Climb to 15,000 feet.....	14.7 minutes
Ceiling .....	23,000 feet
Landing speed .....	40 M. P. H.

Color schemes (optional).....	Colored, dope
Yellow and Green .....	White and Green
Orange and Blue .....	Yellow and Blue



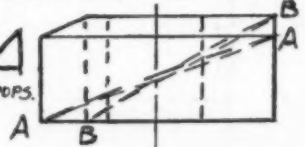
SCALE PROP.  
WHITE PINE (OPTIONAL)

PROPELLERS

PROP.-FLYING

BALSA

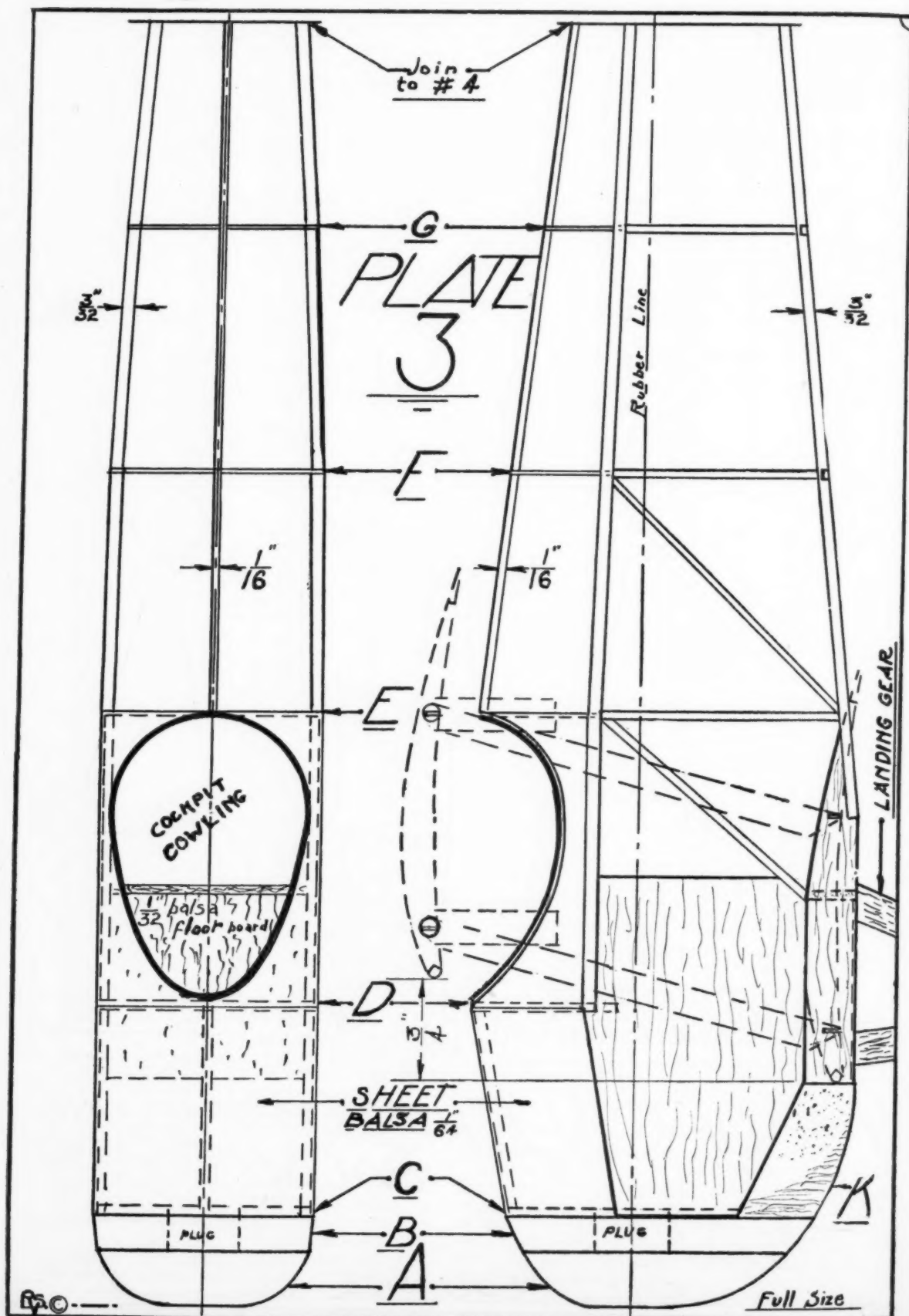
rt. hand PROPS.



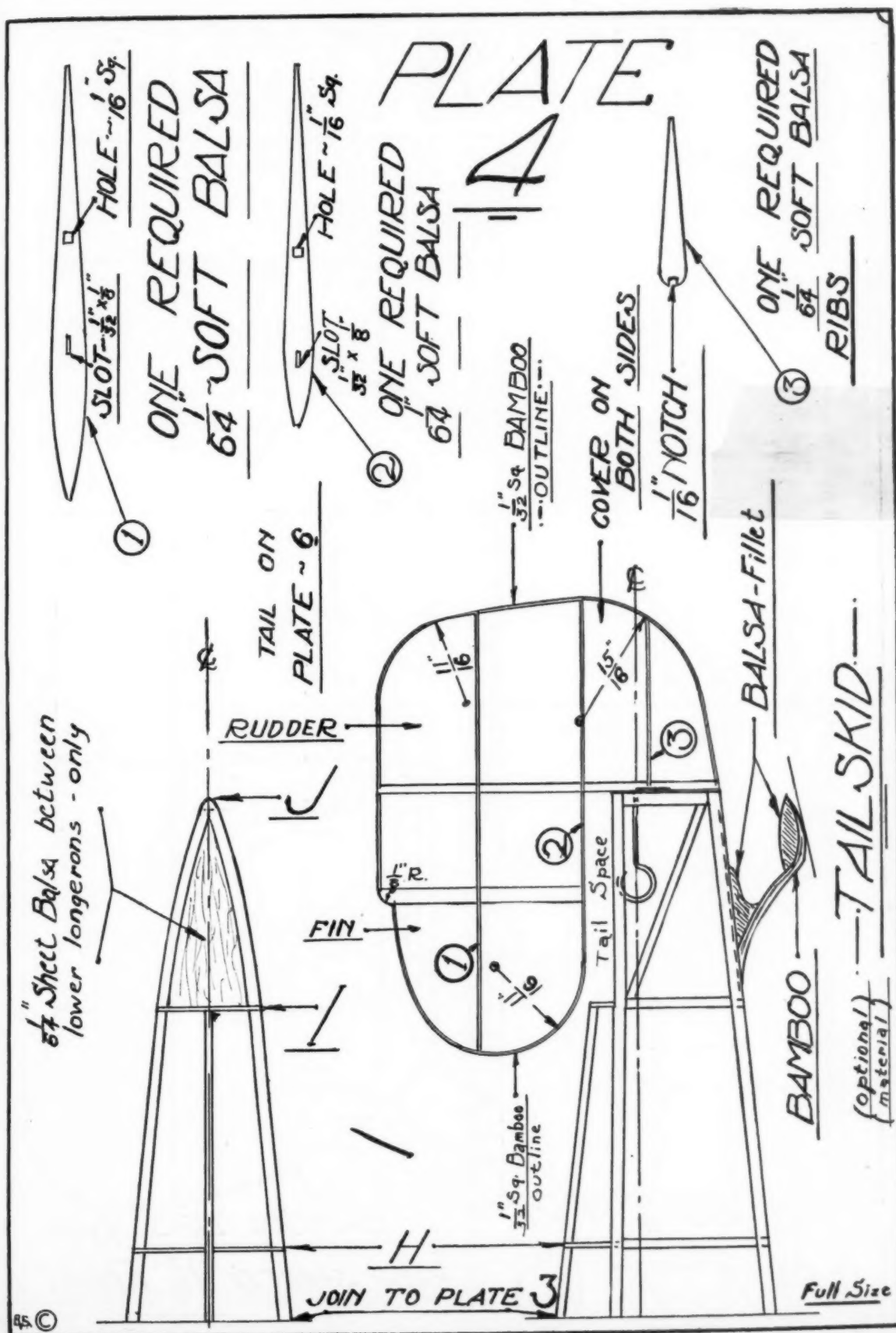
END VIEW

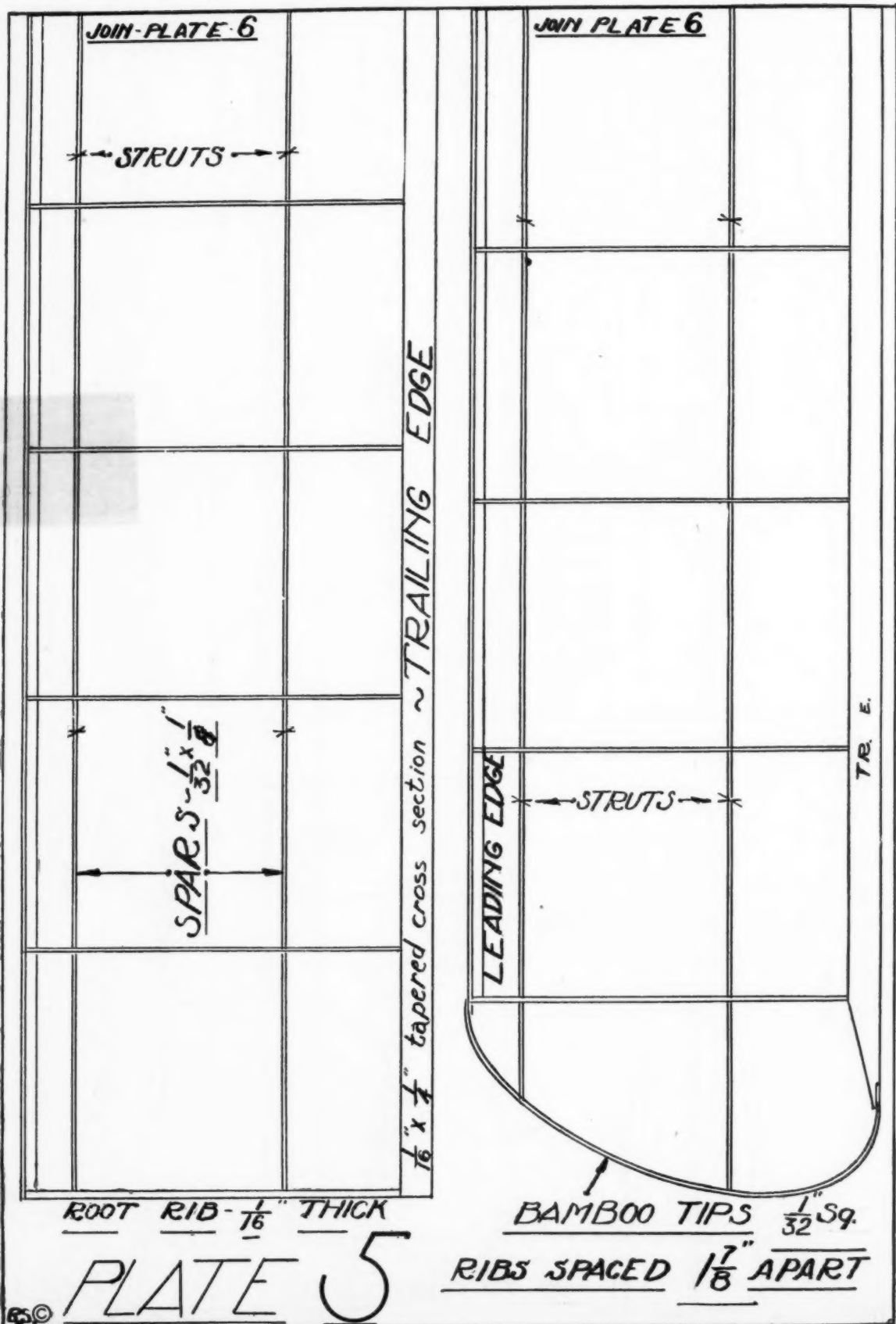
PLATE -- II

SCALE -- FULL SIZE



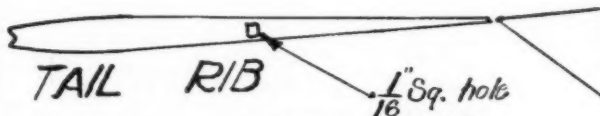






# PLATE 6

FULL SIZE



TAIL RIB  $\frac{1}{16}$ " Sq. hole

FOUR REQUIRED  
 $\frac{1}{64}$ " SOFT BALSA

ROUNDED EDGE

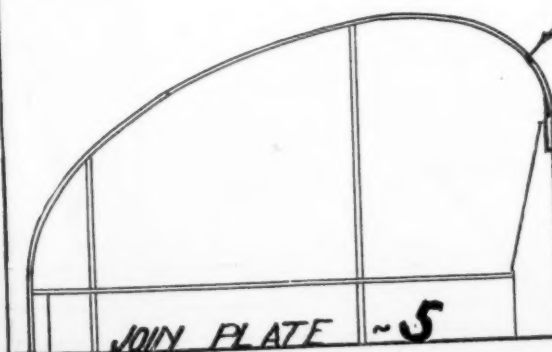


CENTER TAIL RIB  
ONLY ONE REQUIRED  
 $\frac{1}{32}$ " SOFT BALSA

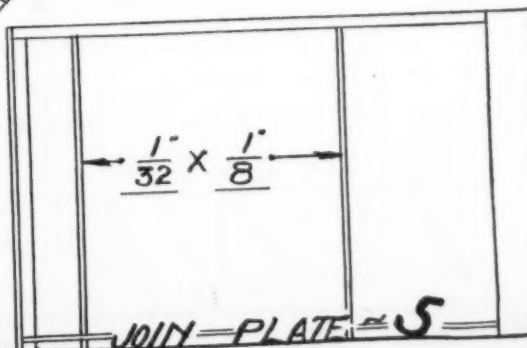
LEADING EDGE

$\frac{1}{16}$ " Sq. X 5" Long

BAMBOO OUTLINE  
 $\frac{1}{32}$ " SQUARE

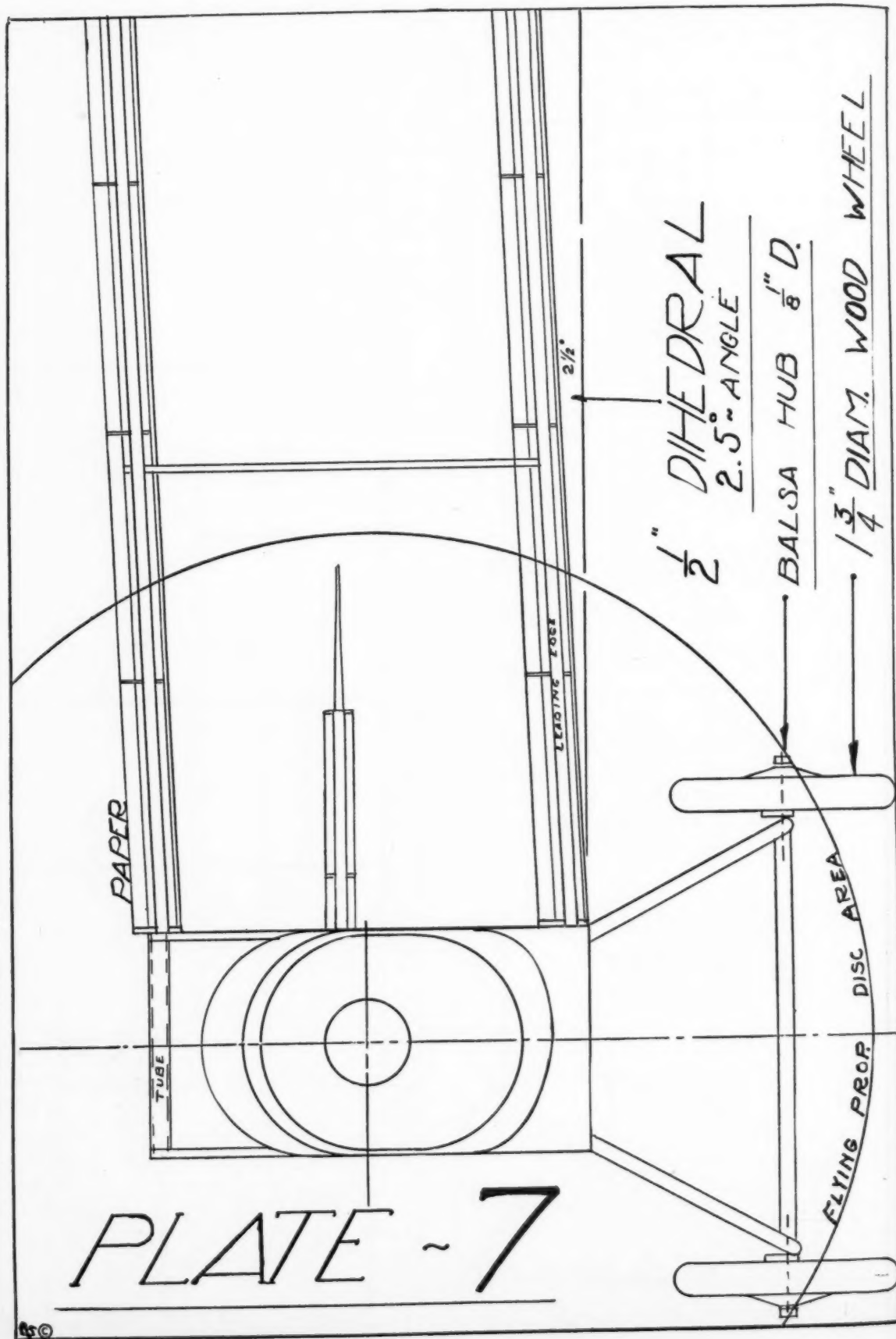


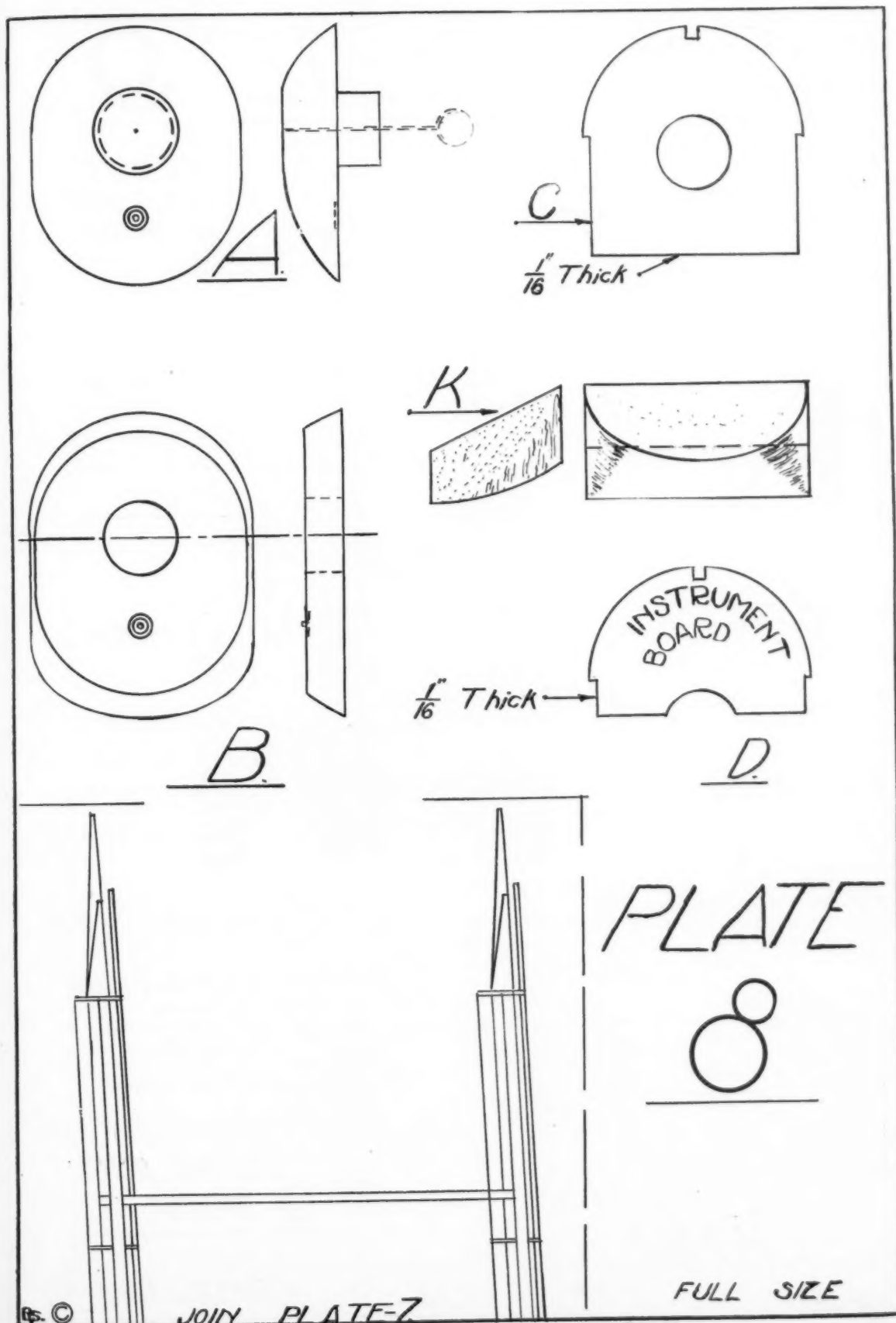
JOIN PLATE ~ 5



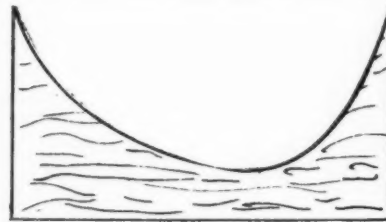
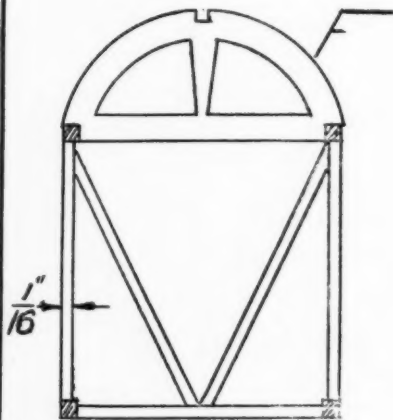
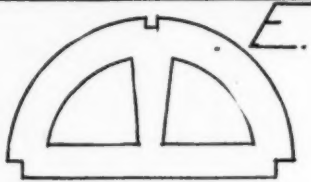
JOIN PLATE ~ 5







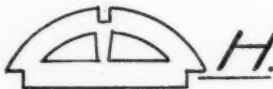
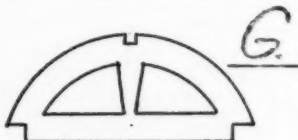
# PLATE 9



COCKPIT  
COWLING  
 $\frac{1}{64}$  Balsa



WING RIB - 24 Needed

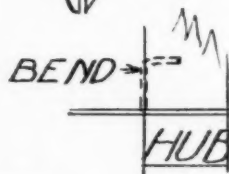


WING STRUTS  
8 REQUIRED

$\frac{1}{16} \times \frac{3}{16}$  Balsa



SHORT STRUT  
- 4 REQUIRED  
 $\frac{1}{16} \times \frac{1}{4}$  Balsa



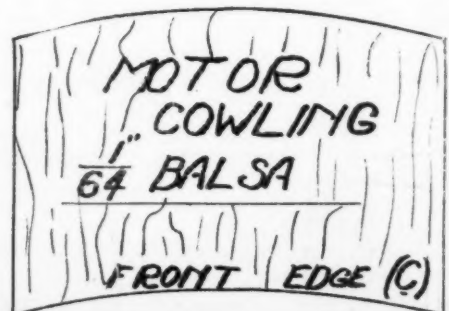
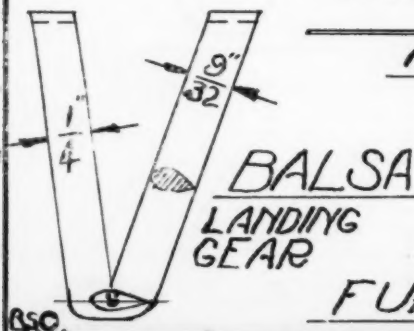
PROP. SHAFT

REAR HOOK

#14 WIRE  
(.033)



AXLE





**W**HEN his native land, Belgium, recoiled to the first shock of the early Boche attacks in 1914, Edmond Thieffry immediately entered the armed service to do his bit in repelling the foe. However, before the air service finally claimed him for their own, his adventurous spirit was whetted by many thrilling experiences.

A "hither and yon life" in the motorcycle corps, a German prison camp, an escape into Holland and finally back into Belgium, his native land, afforded a unique training for his aerial activities to follow.

Not satisfied to be a ground hog, crawling and wallowing day after day through the stinking mud of Flanders, his gaze was continually turned skyward. Overhead the sky knights roared back and forth, dipping, turning, fighting, in a wild round of adventure and intense activity. Thieffry followed their maneuvers with longing eyes. At last, after much red tape and delay, he was granted the transfer for which he had applied.

He began his flying career as a bomber. A great deal of the work was done at night when the ever watchful invaders from across the Rhine had less chance of spotting the planes as they flew toward Germany with their deadly cargoes of explosives.

Thieffry had a number of successful bombings to his credit, his skill in reaching isolated destinations in the darkness being particularly marked. More than one German or Austrian munition dump or supply depot went up in smoke and flames as the result of his skillful work.

His officers recognized the inherent ability of the crafty flier as a pilot so he was given a number of important reconnoitering missions for the purpose of spotting enemy strongholds during the hours of daylight. This work was very important and took a great deal of cool courage and skill to accomplish. Often times when German ships rose up to drive the invader off or destroy him Thieffry would coolly complete the studies he was making of the land below, utterly neglectful of the vain attempts that zooming Boche airmen about him were making to bring him down.

Thieffry kept up the valiant service throughout the greater part of 1916, making almost daily flights either on bombing expeditions or varying it with reconnaissance work when the General Staff wished some particular information that was desperately needed to carry out a battle plan.

During all this time, the gallant Belgian flier had been subjected to some heavy punishment from the German fliers who had come to know his extraordinary skill and were making unusual efforts to get him permanently out of the way. Thieffry thought it was about time that he began to do a little fighting on his own account so he applied to his superiors for a second transfer—this time with fighting aviators.

The authorities recognized the justice of his claims and

# Belgium's Greatest Ace

## The Story of Edmond Thieffry and His Fight With Fourteen Enemy Planes

By F. Conde Ott

in the December of 1916, Thieffry began training on a Nieuport. Thieffry had a perfect makeup for a combat flier. A man of extreme patience, he was willing to wait an almost endless time for his quarry without the traces of nervousness or impatience that had sent others to an untimely death through some tiny slip. To this valuable asset, Thieffry added the qualities of boldness and valor and an utter disdain of death, once he had finished his combat training, that soon made him feared among the Germans. He was untiring and aggressive.

Almost daily it was Thieffry's ship that was first wheeled out of the hangar at the break of dawn. Every minute of daylight was precious, and even the last late moments of evening twilight usually found him up in the sun-tinted clouds scouring the fast darkening sky for one last shot at a German.

In between the rise and fall of the sun, he was at his controls constantly, the only respites he allowed himself from his self-appointed gruelling labors being the necessary stops now and then for a meal, or gas, oil and mechanical attention to his trusty craft. The latter received the best of care for Lt. Thieffry was too seasoned a campaigner to be caught in a fray without perfect equipment.

Had this untiring Belgian officer been stationed in a sector where heavy engagements were constantly taking place it is hard to conceive what a great score of enemy ships he might have rolled up with this constant vigil of the skies he so faithfully maintained. As it was, however, Thieffry was assigned to a quarter of the

front that was comparatively quiet and half of the job of getting his man was finding him. But the unceasing efforts that the able lieutenant put into his tasks bore fruit in any event.

**B**RUSSELS was in control of the Germans when Thieffry entered the fighting end and one of the first things he did was to head for the city and fly over it at an extremely low altitude, dropping cheering messages of hope and consolation for his countrymen. These he interspersed with other offerings of less friendly nature that were directed at the German invaders.

These early months of 1917 with its bitter European winter were none too good for flying and the Germans were confining their air efforts to more productive quarters. Thus it happened that the first victory did not come until the 15th of March.

Thieffry had been awaiting this great moment in his flying career so long that his initial conquest was a short affair. The lieutenant first saw (Continued on page 39)



Edmond Thieffry, one of the greatest World War aces and his mascot

# Build the World's Fastest Pursuit Plane

## Here You Have Instructions and Plans to Build a Solid Model of the U.S. Army's Latest High Speed Pursuit Ship

By Robert Morrison

**T**HE Boeing Airplane Company of Seattle, Washington, one of the leading airplane manufacturing organizations in the world, has just completed a new pursuit plane for the army, the XP-936. It is a radical departure from the famous P-12 series, having only one wing and built entirely of metal. The fuselage is a clean, highly streamlined monocoque structure, the semi-low wing having a smooth metal skin covering. The XP-936 is rated as one of the fastest pursuit planes in the world and is now undergoing tests at the Material Division. The power plant is a new supercharged Pratt & Whitney "Wasp" engine. It is expected that the new supercharger will afford the plane greater speeds than heretofore at high altitudes. A new tail device is incorporated in the design, the stabilizer being fixed while the longitudinal balance is obtained by means of trailing edge stabilizing flaps on the elevators.

The model may be made from white pine or balsa wood. Plans No. 2 and 3 are full size and if you follow instructions carefully, you will have no trouble. Be neat and accurate.

### Wing (No. 2 plan)

No. 2 plan gives you the outline of the right wing. Trace top view of this outline on board and cut to shape with jig saw. As you note on No. 2 plan, there are four sections to wing, two sections of the wing proper and two stub wings. In making these, be sure that one wing and stub are for the right hand side of fuselage, while the others are for the left hand side. Next draw front view of wing on leading edge of the four sections. Then, using small chisel or sharp knife, cut entire wing to shape. Take plenty of time and shave down the wood in the direction of the grain. It is not imperative that you carve the bulge in the stub wings where they meet the fuselage as you may use putty to make the streamlining effect after the assembly of the model is completed.

The dowels are not absolutely necessary but they will add to the strength of the construction of the plane.

Cut slant in wing proper where it connects with stub wing as shown in front view so as to give a 3° dihedral angle when assembled.

Sandpaper four sections first with coarse sandpaper and then with fine sandpaper.

Make two lights out of scrap wood and ambroid them to wing tips.

Pressing heavily on pencil, make groove in wing, outlining aileron. The insignia will be put on when painting.

Go over all parts once more with fine sandpaper, giving them a smooth, clean finish.

Make air speed indicator with razor blade. Round it out with sandpaper. Inject two pieces of bent wire (pins) in front end.



The Boeing low-wing all-metal monoplane, XP-936, powered with a supercharged Wasp engine

### Tail Surfaces (No. 2 plan)

The tail surfaces are made in a similar manner as the wing. The fin and rudder are all one piece, also the elevators and stabilizer sections. The hinges that are shown in plans are artificial and will be put on after tail units are constructed.

Take the piece of wood that you obtained for the tail units and cut off a section large enough for making the rudder and fin. Draw outline of these on piece and then cut to shape as you did on the wing. A razor blade comes in handy when carving the tail units.

Streamline rudder and fin with coarse sandpaper and then smooth over the surfaces with fine sandpaper. Make sure that you have no slight dents as they will become noticeable after plane has been painted.

Draw groove separating fin from rudder as you did aileron from wing.

Make small tail light with razor blade and ambroid it to top of fin.

Next proceed to carve out the horizontal tail surfaces, that is, the stabilizer and elevators. After sandpapering them, make groove dividing stabilizer from elevators. Out of a 1/8 square inch strip, make six artificial hinges as shown on detailed plans. Ambroid them in place. Then draw outline of stabilizing flaps on elevators. Make four

### MATERIALS NEEDED WOOD

No. of Pieces	Size	Part of Plane
1	16" x 3" x 1/2"	Wing
1	9" x 2 3/4" x 3/8"	Tail surfaces
1	9 1/2" x 2 1/2" x 2"	Fuselage
1	3/16" x 2" x 5"	Landing gear
1	1/16" x 1/16" x 6"	Windshield, etc.
1	4 1/2" x 1/4" x 1/4"	Propeller
1	12" x 1/2" x 1/2"	Cylinders
1	2" x 1" x 1"	Miscellaneous
2	5/8" radius, 1/4" tread	Wheels
1	1/4" radius, 3/16" tread	Wheel
1	Spool of black thread	Guy wires
1	2 oz. can	Ambroid
1	2 oz. can	Olive drab
1	2 oz. can	Orange
1	Smallest possible	Blue
1	Smallest possible	Red
1	Smallest possible	White
1	Smallest possible	Black
1	Smallest possible	Silver

horns (see end view of elevator) and ambroid them on top and bottom of flaps. A small piece of black thread tied to the top of the horn and pinned fast to the elevator will act as control wire.

### Fuselage (No. 3 plan)

The fuselage will not be difficult to build if you work slowly and follow plans and instructions carefully. No. 3 plan shows details of fuselage.

It is made in exactly the same fashion as wing and tail units. Draw side elevation, cut; draw top elevation, cut; then give it its monocoque shape by referring to fuselage forms No. 1, 2, 3, 4. Broken lines on side elevation of fuselage indicate sections that forms illustrate.

A small sharp chisel is preferable for rounding out the fuselage. Always cut with the grain. After chiseling, most of the rough spots may be gotten off with coarse sandpaper.

The tail wheel housing may be made separate or as part of the fuselage. Do which ever suits you better. The head rest at top of fuselage may also be made separate. Hollow out housing in order that tail wheel might fit.

Hollow out cockpit. This may be done easily and neatly by starting at top of fuselage with jig saw and cutting down along two broken lines, one formed by back of pilot's seat and other directly in front of dashboard. Saw down as far as floor of cockpit. Then cut along floor. Sandpaper inside of cockpit thoroughly. Then, taking block that you have just sawed out, cut off the two sides with razor blade, allowing them about an eighth of an inch thickness. Put ambroid on the bottom edge of the two sides and join them in their former position on fuselage. Putty up all cracks. The cockpit will then be ready for the installation of controls and seat. Sandpaper whole fuselage once more.

**T**HE seat may be made from a solid block of wood with a razor blade. The two rudder pedals, "joy" stick, and dashboard may be made from scrap pieces of wood. They will be installed when assembling model.

The windshield is the next thing to be constructed. It is made from a 1/16 square inch strip of wood. Use razor blade for cutting up strip. Ambroid parts securely in place on fuselage. Wait a few moments for connections to dry and then apply isinglass or heavy cellophane to take the place of glass on the windshield. Colorless ambroid is preferable in cementing the windows.

### Landing Gear (No. 3 plan)

In making the landing gear, make sure that the two "pants" on the wheels are exactly alike. The two forward wheels on the XP-936 are of the latest streamlined design and have not been used heretofore on any plane. They are very simple in design, and they may be made easily

from pieces of wood left over from wing or tail units. Draw the circumference of the two wheels with compass and then cut, using razor blade. Then, using sandpaper, round off edges. Drill small hole in center for axle. Go over both wheels with fine sandpaper and that is all there is to them.

The tail wheel is of a small balloon "doughnut" type. This may be made or bought. Lay this wheel aside with the other two until you are ready to paint them.

The rest of the landing gear, which consists of two

"pants" and two streamline fairings that cover struts on real plane, are made next from solid wood. The "pants" and strut fairings may be made all as one or separately—separately preferred. Draw outline of direct side elevation, cut; then front elevation, cut; and then taper down pieces with sandpaper, giving a smooth streamlining effect. The next step is to hollow out "pants" for the installation of wheels which is done by slicing them in half vertically from nose to trailing edge, using only a razor blade in doing so. Cut out the inside of the pants, leaving plenty of room for the wheels, and then ambroid the halves together again. When ambroid has dried thoroughly, go over all parts of landing gear with fine sandpaper. The wire bracing will be done later. The streamline fairings over landing gear cut down a great deal of wind resistance, thus affording the plane more speed.

### Motor and Cowl (No. 3 plan)

It is best to purchase the townsend ring (cowling over motor to cut down wind resistance) though one may be made from a thin strip of a good grade of cardboard. Bend the strip into shape and connect the two ends with ambroid. Let the ring soak in water a minute so it will retain its circular shape.

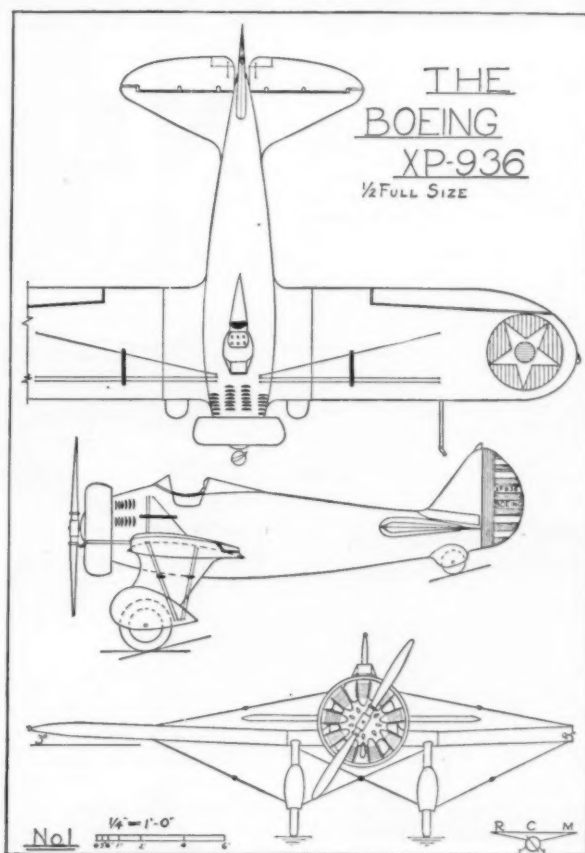
The whole motor may also be purchased if desired. If not, cut out nine cylinders from 1/2 square inch stick with razor blade. Leave heads flat but round out rest of cylinder. Smooth over with fine sandpaper and then apply ambroid to rounded part. Wrap black thread around cylinder before ambroid dries, leaving 1/16 inch space between rounds. Cut off eighteen push rods from 1/16 square inch strip. The push rods are the two struts in front of each cylinder. The motor will be assembled later.

The propeller is made with a knife. Plan No. 3 shows the details at the upper right hand side. Drill small hole for pin which will act as propeller shaft.

### Painting

Go over all parts with fine sandpaper and then thoroughly brush off sawdust.

A lacquer or dope is best for painting the model. Many coats may have to be applied before you get a smooth, glossy finish. Paint the inside (Continued on page 39)





# MODEL BUILDER NAVARO SMITH of 100 V

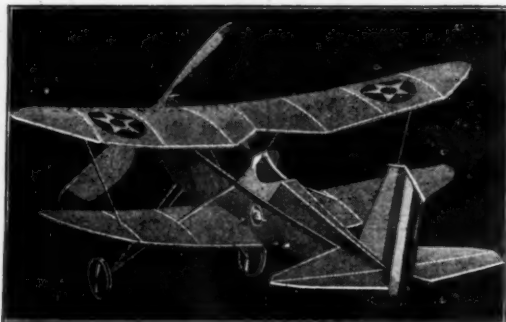
## **Best** of finest quality and light weight—your de

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### "Your ARMY-C-I PURSUIT Made a RECORD FLIGHT of 1300 Feet—Easiest Ship I Ever Built—Plans So Easy To Follow!"—

CLYDE KOWALKA

Greatest flying fighter ever! Orange wings, brown fuselage. NEW U. S. rudder stripes in red, white, blue! Very easy to build. Looks simply swell—and Free Glider comes with Kit in bright yellow box! Only 75c. postpaid! Order! COMPLETE KIT

HAS: Stamped ribs and bulkheads, spec. bal. nose block, cellu. wheels, sized bal. strips, all wire parts, strip bamboo, insignia, Jap. tissue, body insignia, sandpaper, banana oil, cement, bal. prop. block, full-size drawing, rubber motor, instructions.

Span, 22"  
Length, 16 1/2"

"Dart's Longest Flight was 2000 Feet!"

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postpaid. ORDER! Space doesn't permit listing but KIT IS COMPLETE AS ARE ALL COMET KITS! Hurry!

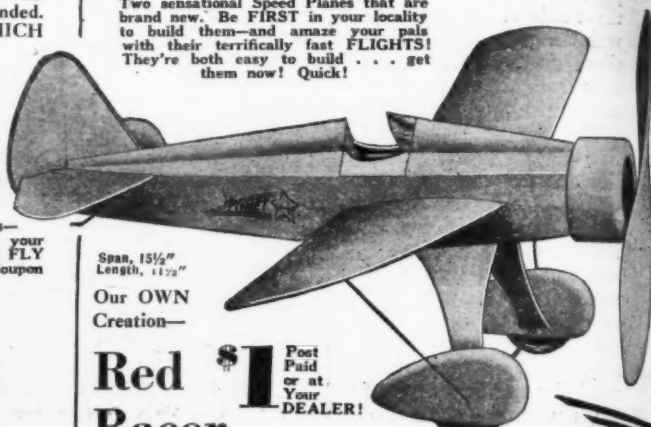
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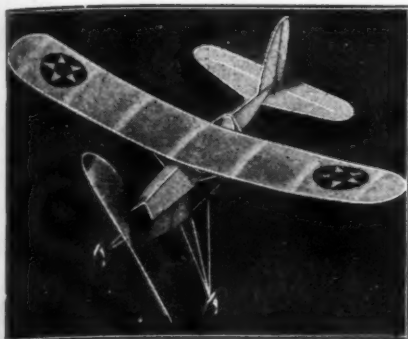
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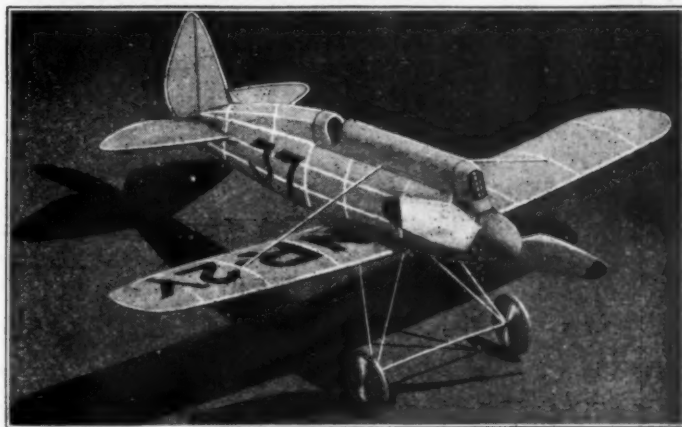
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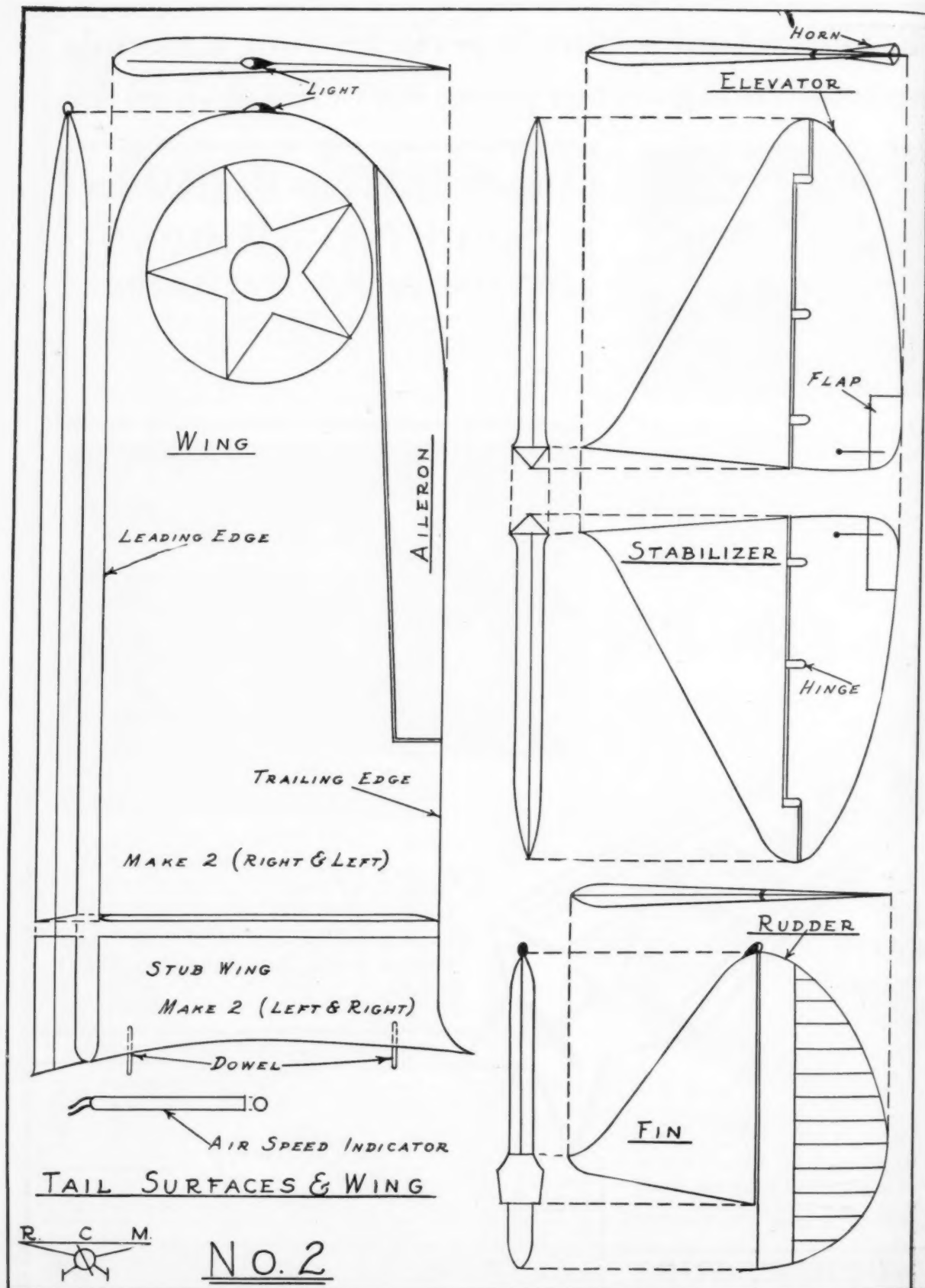
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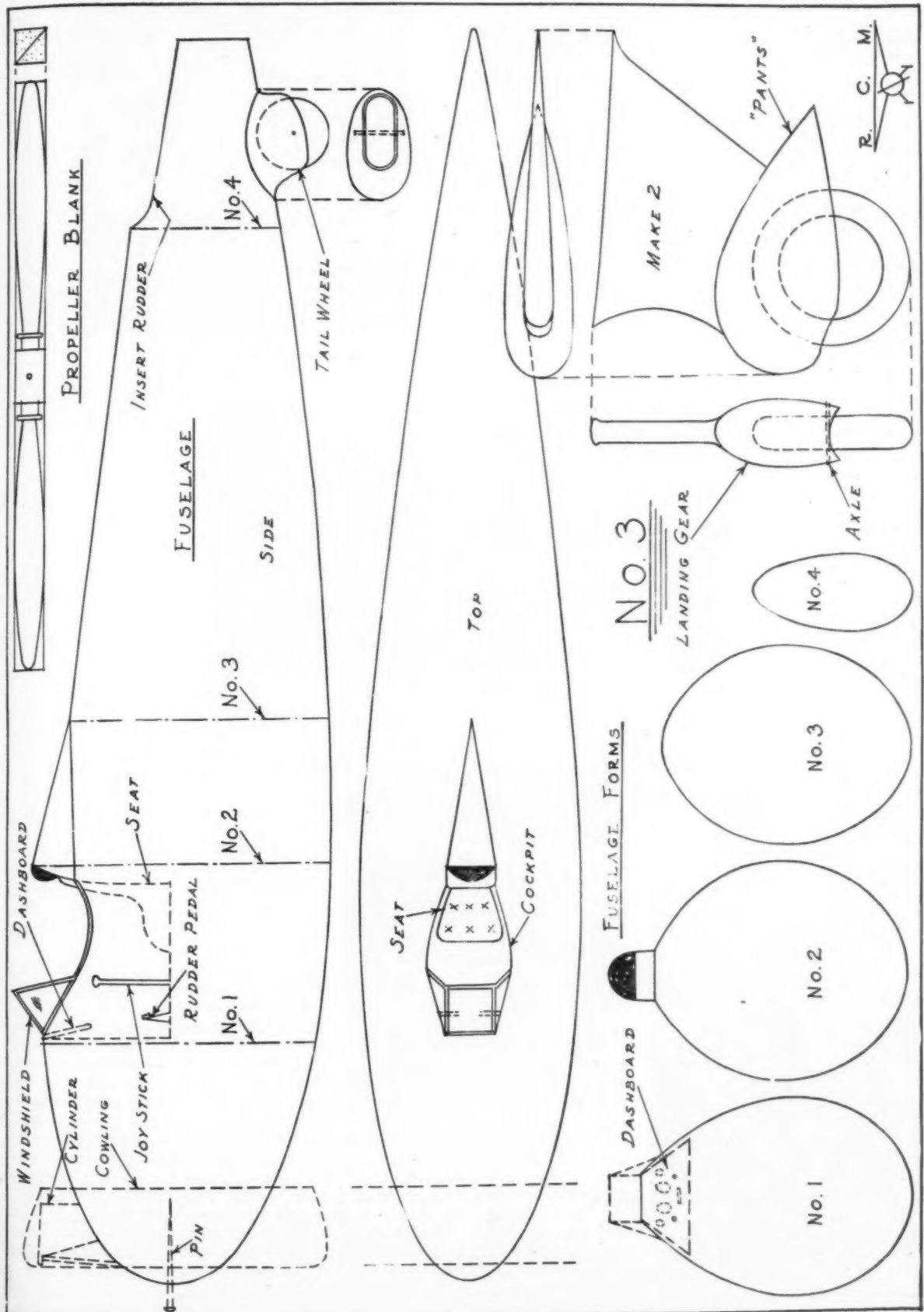
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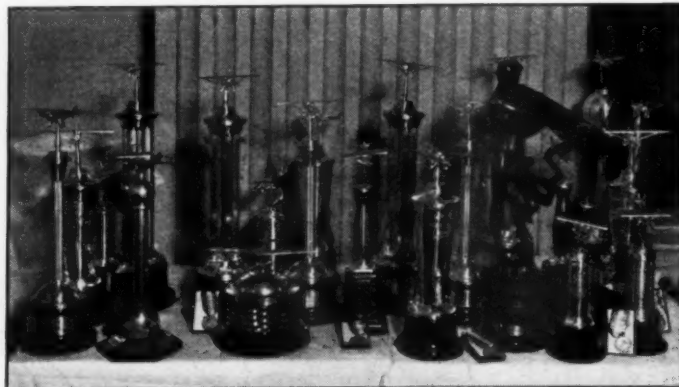
# AIR—WAYS

## HERE AND THERE

Get Busy and "Air" Your "Ways" of Building and Flying Model Planes. In Each Issue of **UNIVERSAL MODEL AIRPLANE NEWS**, Space Will be Devoted to the Activities of Our Readers. Let **OTHERS** Know What **YOU** Are Doing

**E**VERYTHING is over but the shouting. The National Model Airplane Contest held at the Atlantic City Airport has come and gone by,

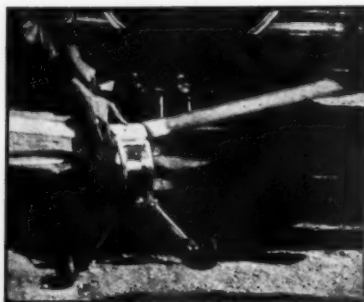
leaving a few healthy dents in the lists of past records. Four world's records were broken beyond repair. Taking everything into account, a great time was had by all due to the beautiful weather, our genial hosts, the Atlantic City Exchange clubs and to the industrious director of the Meet, Mr. Irwin S. Polk of L. Bamberger & Company, Newark, N. J. This latter organization held the meet under the auspices of the Na-



Trophies which were given to the winners at the National Model Airplane Contest, held at Atlantic City, Sept. 9th and 10th



James Parham of Indianapolis, Indiana, who won the Stout Fuselage Contest



Bassett's model warming up for a flight

tional Aeronautical Association and the Airplane Model League of America.

Boys from coast to coast entered their planes in competition for the four standing American trophies and the Lord



Picture No. 3. Gordon Light and his winning Wakefield model. It flew for 25' and 35" in the official elimination flights

Wakefield British trophy. In addition, there were 26 silver cups and 47 gold, silver and bronze medals. The entrant coming the farthest distance was Ted Jacques, 598 Main Street, Portland, Oregon. The mid-west states had a good showing, although the majority of the boys were from the metropolitan district.

The outdoor events were held on Friday, September 9th, at the Atlantic City Airport.

The wind was the only handicap to the boys, but notwithstanding this handicap the world records were broken. John Ginnett, 131 South Mississippi Avenue, Atlantic City, N. J., broke the standing record in the Mulvihill Event with his plane flying 6'—57-3/5".

James Parham of 457 Arsenal Avenue, Indianapolis, Indiana, won the Stout Outdoor Fuselage Event with a flight of 4'—57".

**T**HE Lord Wakefield Event was held on Saturday, September 10th, because the winds were too strong on

Friday. There were two world records made in this event which was most important due to its international aspect. The English boys have tried hard for three years to take their Wakefield trophy home again but the American lads have tried just as hard to keep it in this country. The international trophy was won by Gordon Light of 1404 Oak Street, Lebanon, Pennsylvania, this year with a record flight of 7'—57-2/5". Light's plane was rubber-propelled. John E. Pelly Fry of London, England, took third place for the British boys with a flight of 3'—22-2/5".

A sixty-inch monoplane taking off from the ground set a world record for gasoline propelled flight. The plane



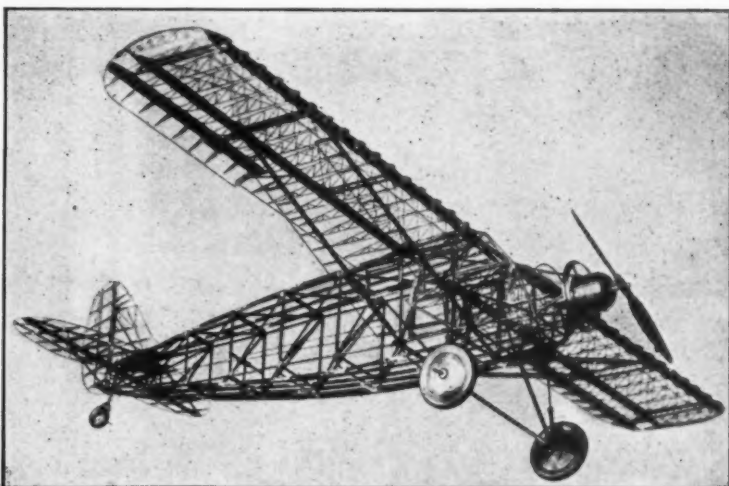
John Ginnetti of Atlantic City, won the Mulvihill Contest. His plane flew out of sight over the city

Avenue, Philadelphia, Pennsylvania. The time was 2'—55", taking fourth place in the Lord Wakefield Endurance competition.

A new world record of 13'—3" for the Stout Indoor trophy was established by a tractor plane constructed by Joseph Kovel of 404 Bristol Street, Brooklyn, New York. This event was held on Saturday, September 10th, in the Ball Room of the Convention Hall. The planes in this contest flew two times as long with half the altitude as in the last national contest and it has given the boys a new theory to work on.

The scale model trophy was won by J. F. Roche, Kansas City, Missouri, with a Stinson Lycoming Junior model. This model contains over three thousand parts and the motor contains over three hundred and fifty parts. Pictures No. 1 and 2 show the completeness of this model. There are elevator controls, rudder controls, adjustable stabilizer, adjustable fin and movable ailerons. The mechanical internal expanding brakes are operated to stop the wheels by pressing upward against the brake arm. Other features of this piece of construction are the shock absorbers, the movable nose shutter, door latches on each door, piano hinges on doors and cowling, upholstered cabin, safety belts, side pockets and cowling latches. The entire ship is built-up.

The boys had a grand time while in Atlantic City. Old friends met and new friends were made. They were introduced to Atlantic City by the most hospitable hosts and



Picture No. 1. J. F. Roche won first place in the scale model contest with this built-up scale model of a Stinson Lycoming Junior. It is complete in every detail

was constructed by Maxwell B. Bassett of 11th Street and 6th

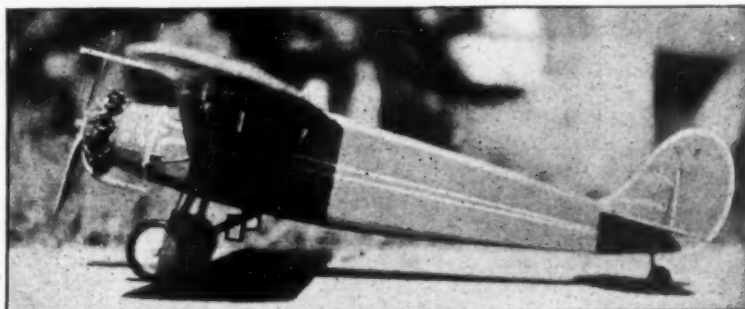
everything was done to make their stay interesting and pleasant. Many hotel rooms were rendezvous for the earnest competitors and many others met in workshops, knee-deep in balsa shavings. The boys had learned by past experience that atmospheric conditions warped and twisted their fragile planes, so they came equipped to build and rebuild their ships. Shops were set up almost upon arrival and

the workers toiled long and late.

The trophies were presented by Major-General Benjamin D. Fulois, chief of the United States Army Air Corps, at a dinner held in the Hotel Jefferson, Saturday night.

### Gordon Light Breaks World Record

There were several features of interest which deserve



Picture No. 2. Roche's model covered. This looks to be the most detailed model ever built

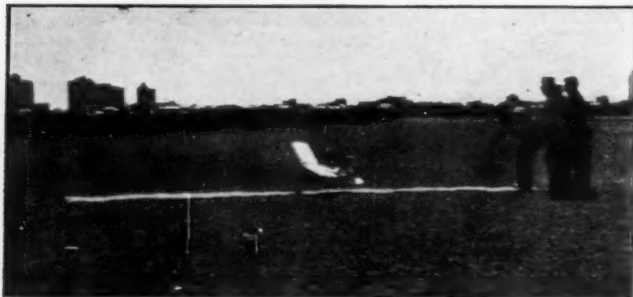


Picture No. 9. Charlie Grant bashfully (or is it rheumatically) maneuvers Fry's (English) plane into position for a take-off

special comment. One was the record-breaking flight made by the unusual cabin model built and flown by Gordon Light of Lebanon, Pa. Picture No. 3, shows Gordon hold-



Picture No. 11. Here he is at last, out of his hiding place, none other than your editor



Picture No. 6. The gasoline model makes a quick getaway

ing his ship. One of the remarkable and interesting features of this plane is the fact that it resembles a scale model. It has a transport fuselage with cellophane windows. This did not take away any of its flying ability, however. In the elimination flights for the Wakefield trophy, this plane flew for 25'—53" and landed eight miles from the airport. Luckily it was recovered without being damaged.

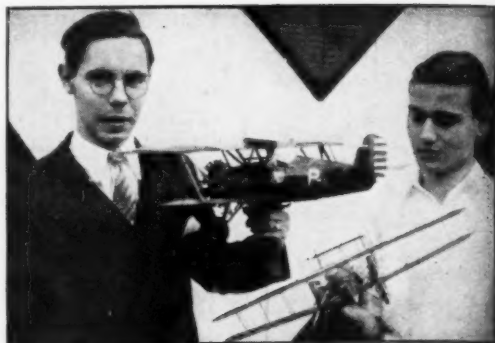
#### Gasoline Powered Model Plane Sets New World Record

Probably the most unusual exhibition at the contest, was the flights made by the gasoline engine model, built and flown by Maxwell B. Bassett of Oak Lane, Philadelphia, Pa. This clever little ship is shown in Picture No. 4. It is shown at the moment of take-off in Picture No. 5. This plane flew for a world record of 2'—55". It was powered by a midget gasoline engine which had a bore of  $\frac{1}{8}$ " and a stroke of 1", and only weighing twelve ozs. The tiny motor is of the two-cycle type, and with a fourteen inch propeller it will turn four to five thousand revolutions per minute. The plane is of the high wing or parasol type which gives it a great deal of its stability. The plane has a span of 4' 9" and is 3' long. On its best flight this plane attained an altitude of approximately 3,000 feet and due to the velocity of the wind it was recovered several miles away from the starting place.

It required three years of experimenting and building for the builder of the plane to finally develop it to a point where it was sure of flying and being stable in the air, the stability being the most essential thing to the successful flying of this type plane. The three things necessary for the stability of this type plane are the large tail surfaces, the parasol type wing, and the large dihedral. Although it is in its infancy this type of plane powered with a gasoline motor will, in the builder's belief, take the place of the rubber-powered model planes in the near future.

#### English Planes Compete

The Wakefield Trophy remains in this country, although the English boys, John E. Pelly Fry and R. N. Bullock, both of London, England, made a strong bid for it with two beautiful low-wing models. These were flown by Mr. Charles H. Grant, Editor of UNIVERSAL MODEL AIR-PLANE NEWS. Fry's model made an excellent flight of 3'—22.2/5". Bullock's



Picture No. 10. Forrest Seiple and Paul Seng of Allentown, Pa., the two villains responsible for Picture No. 9. Nevertheless, they are expert model builders and for that reason must have some good qualities

model did not perform so well. It flew for 1'—18.2/5". This was not due to the lack of inherent flying qualities of the machine itself, but rather to the difficulty in getting the proper flight adjustment, due to the fact that the tail surfaces were badly warped. This condition evidently caused

the ship to stall in flight even though every effort was made to correct it and the wing was carefully set at the marks indicated by its builder. Sea voyages are evidently not helpful in this respect.

Further misfortune overtook Bullock's plane when the rubber broke while it was being wound and demolished the tail surfaces. It could not be understood why this happened as the motor had been wound only to 600 turns (120 winder turns) and the rubber did not appear to be under strain. The full capacity was 900 turns. The explanation may be that the rubber

had been in the box for three months and had been subjected to the action of salt air for a considerable length of time. This unfortunate incident undoubtedly prevented the plane from making a better record on its third flight.

Picture No. 6 shows Mr. Fritz adjusting the propeller on Bullock's ship just before it was launched. In Picture No. 7 Mr. Grant has just finished winding Fry's entry, while Picture No. 8 shows this ship as it was getting away for its long flight.

#### Editor Makes Debut

Two young men, Forrest Seiple and Paul Seng of Allentown, Pa., at a very unfortunate moment during the big contest, snapped Picture No. 9. Apparently this picture has little value from a photographic standpoint, but I am going to let you in on the secret. The distorted figure is none other than your once respected editor. From appearances it would seem that he is a little bashful or afflicted momentarily with a severe case of rheumatism. However, actually neither of these afflictions is the cause of this super-dignified attitude. He was merely over-cautious that the exceedingly long wing of Fry's model would surely clear his legs upon the take-off.

It is only fitting under the circumstances that he should retaliate against



Picture No. 4. The record holding gasoline powered plane, constructed by Maxwell B. Bassett of Philadelphia, Pa.



Picture No. 6. Mr. Fritz of the Philadelphia Model Club puts the finishing touches on the propeller ratchet of Bullock's (English) plane, before a flight





Ralph Kummer, who won three first places in the contest held at Park's Airport, by Stix Baer and Fuller Co., St. Louis, Mo.



Ralph Kummer (left) and Richard Prough and the prizes they won at the St. Louis meet. Prough was high point winner

the perpetrators of this atrocity and show them up for what they are, so he is printing their picture. Picture No. 10, shows them, Forrest Seiple (left) and Paul Seng (right) with two models which they have built. This photo is also slightly distorted, so in order to compensate for this fact and get a true conception of their exact appearance, it will be necessary for you to view the picture of these two fiends through a concave or convex reading glass. If Barnum or Bailey should by any chance read this, let me state that Mr. Grant feels credit is due him for calling to their attention these two remarkable specimens.

However, he does not wish to be too severe as they have partially redeemed themselves by sending a front view of him which is a better likeness, Picture No. 11. Probably the inspiration to snap Picture No. 9 was caused by the fact that they are used to photographing airplanes, in which case it is desirable to include prominent views of the tail surfaces for technical reasons.

The following list, compiled by Mr. Irwin S. Polk, Director of the Fifth National Contest, gives all the awards won by the contestants:

#### WAKEFIELD.

Gordon Light, 7'-57-2/5", 1404 Oak Street, Lebanon, Pa.

Arthur Rugger, 4'-13-2/5".

J. E. Pelly Fry, 3'-22-2/5", London, England.

Maxwell Basset, 2'-55", 11th Street and 6th Avenue, Philadelphia, Pa.

Vernon Boehle, 1'-49", R. R. 1, Box 188, Indianapolis, Ind.

Stephen Faynor, 1'-44-2/5", 66 Congress Street, Newark, N. J.

Paul Schaefer, 1'-22", 3607 East 16th Street, Indianapolis, Ind.

R. N. Bullock, 1'-18-2/5", London, England.

John Young, 1'-15-2/5", 241 East 49th

Street, New York City.

#### SCALE MODEL EVENT.

Stinson—J. F. Roche, 3027 Agnes Avenue, Kansas City, Mo.

Boring—Joseph Battaglio (21), 925—3rd Avenue, New York City.

Aronica—Frank Distler, 130 Tremont Avenue, Fort Thomas, Ky.

Fokker—Robert Crawford (16), 5319 Charles Street, Philadelphia, Pa.

Sirrius—H. W. Owen, 50 Mason Drive, New Britain, Conn.

Supermarine—John P. Tyskeericz, 12 Yoremer Street, Hartford, Conn.

#### MULVIHILL.

John Ginnetti (16), 6'-57-3/5", 131 South Mississippi Avenue, Atlantic City, N. J.

Henry Orzechowski (18), 5'-30", 411 South 18th Street, Newark, N. J.

Vernon Boehle (17), 4'-50", R. R. 1, Box 188, Indianapolis, Ind.

Gordon Light (17), 3'-55", 1404 Oak Street, Lebanon, Pa.

Alton Du Flon (15), 3'-22", 561 Prospect Avenue, Ridgefield, N. J.

Joseph Kovel (17), 3'-09", 404 Bristol Street, Brooklyn, N. Y.

William Coughlin (18), 3'-06-4/5", 194 Warren Avenue, East Providence, R. I.

August Ruggler (16), 2'-50", New York, N. Y.

John Zaic (17), 2'-21-3/5", 328 East 6th Street, New York, N. J.

John Romanowski (16), 2'-14", 205 Railroad Avenue, Jersey City, N. J.

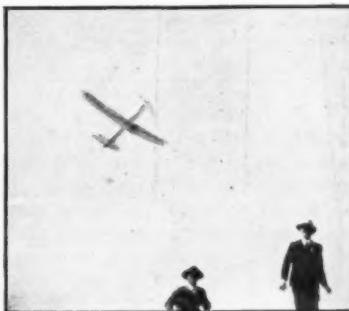
Dick Tremarco (20), 2'-11-2/5", 166 Elm Street, Newark, N. J.

Frank Zaic, 2'-08-2/5", 328 East 6th Street, New York, N. Y.

Edward Beshar, 2'-01", 76 Seneca Avenue, Tuckahoe, N. Y.

Paul Schaefer, 2'-00-1/2", 3607 East 16th Street, Indianapolis, Ind.

Henry Runkel, 1'-24", 10 Beechwood Pl., Elizabeth, N. J. (Continued on p. 41)



Picture No. 8. Fry's model climbs for altitude after the take-off. Charlie Grant (right) who flew the English entries, holds his breath until assured of the success of the launching



Picture No. 7. Preparing Fry's (English) model for its flight of 3'-22-2/5"

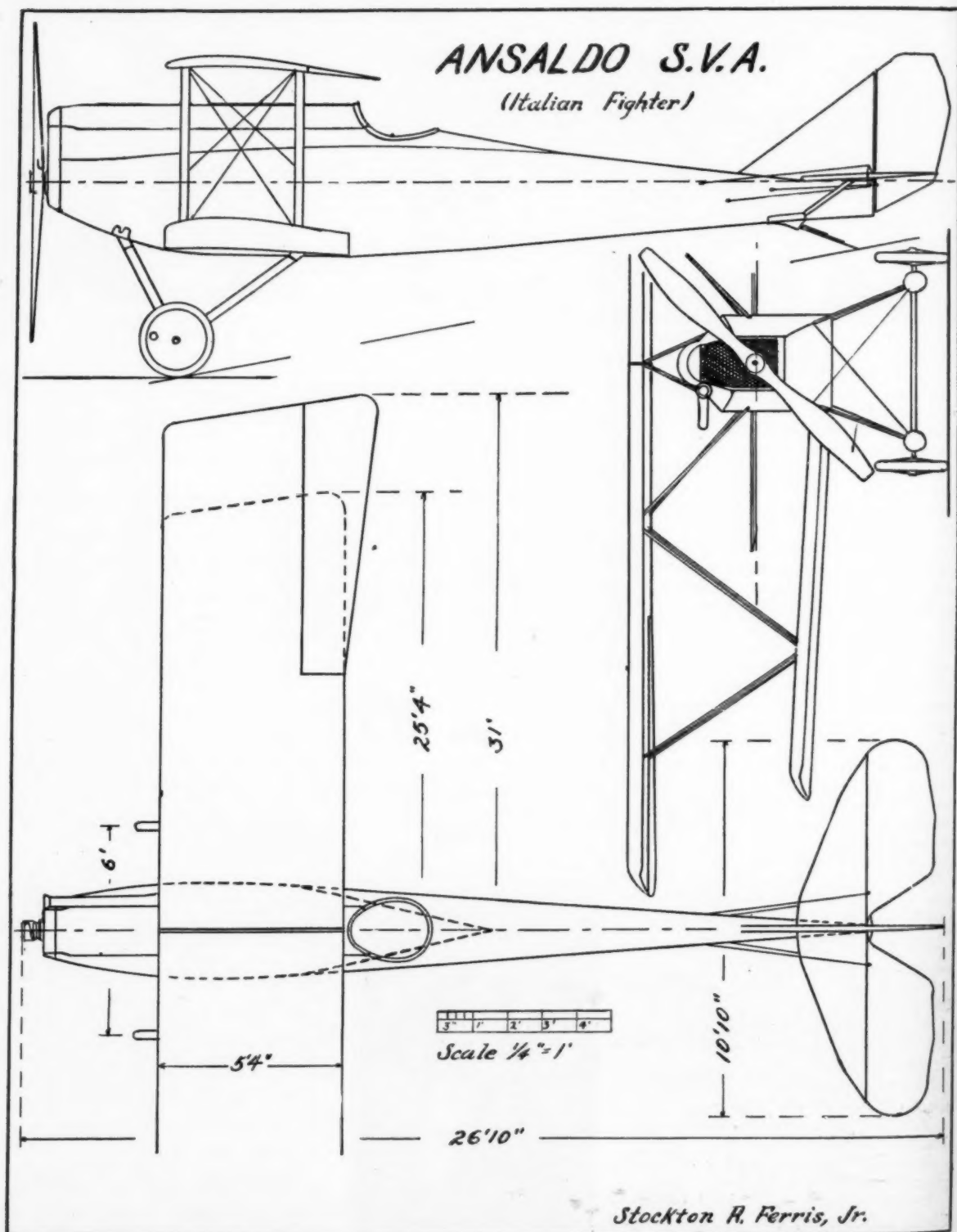
# THE ITALIAN ANSALDO S.V.A. FIGHTER

This plane, while not as well known as some of the other war ships, gave a creditable performance, and was very popular with the Italian airmen.

Unusual among its features are the strut braced wings and the unusual fuselage shape. Note how the two lower longerons converge behind the lower wing. This causes the rear portion of the fuselage to be triangular.

The high narrow radiator was placed in front of an SIA engine of 210-220 h.p. This had six cylinders and was of the upright in-line type.

While this machine landed at only 45 m.p.h., it had a top speed of 140 and could climb more than 1000 feet per minute, a good performance even now.



# Aviation Advisory Board



Conducted by  
**CHARLES HAMPSON GRANT**  
Chairman of the Board.

Formerly of  
The Technical Section, Air Service, U. S. Army.

**H**ELLO, readers. This month you can prepare yourselves for some very interesting questions. In order that we may answer a considerable number of them, we will be as concise with each one as possible.

John Trischka writes us from Bisbee, Arizona, and asks the following questions:

Question 1. I live in an altitude of about a mile. Will this effect the performance of my models?

Answer. Yes, the performance will be effected decidedly. Your models will have less duration, and more speed. This is due to the air being of lower density. While flying models at an elevation of 2,000 feet, I have noticed a marked difference in the performance, than when flown at sea level.

Question 2. Is it possible to prevent fuselage warp caused by stress from the wound rubber-band when no motor stick is used?

Answer. It is possible to make this warp negligible by building the fuselage sufficiently rigid. However, it is a distinct advantage to have the fuselage warp slightly. If the fuselage warps under the tension of the rubber, the stabilizer will be slanted slightly out of line with the wing. This slant causes the machine to have a tendency to turn to the right when a clockwise propeller is used. Now, here is the trick of the whole business. The clockwise propeller has a tendency to turn the machine over to the left, due to the propeller torque. If you build a fuselage so that it will warp just sufficiently to create a tendency to turn to the right, that will exactly balance the propeller torque trying to turn to the left, and your machine will fly an absolutely straight course. In other words, fuselage warp may be used to neutralize the turning tendency of the propeller torque. This has been tried out in practice many times and is very successful.

Question 3. What is the ratio between the length of the fuselage and span of the wing?

Answer. A ratio that will give you good proportion is a span of one and fuselage length of two-thirds.

Question 4. Is it possible to make an efficient propeller by warping sheet balsa over steam?

Answer. Yes. This depends entirely upon the ability of the workman. If you accomplish your task accurately and thoroughly, there is no reason why the propeller will not be most successful. However, the wood may have a tendency to spring back into its original shape, if after steaming thoroughly the parts are not baked in the oven while being held in the desired shape.

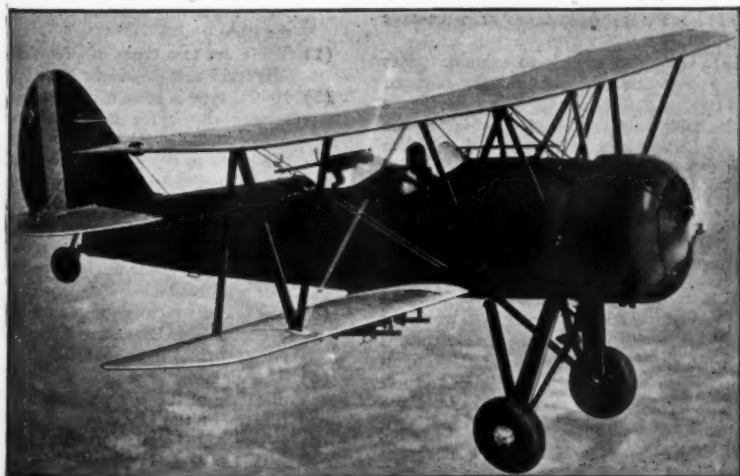
**G**ERALD JENSEN of 4693 Marcy Street, Omaha, Nebr., requests information for a twin pusher, which he wishes to build sometime in the future. This may be of benefit to many of our readers, so we are publishing several of his questions.

Question. Should the main wing of the twin pusher be flat on the bottom or curved, if the ship is to be built for duration?

Answer. I believe that the main wing on such a ship should have a slight curve on the under surface. This decreases the sinking velocity as well as increases the lifting capacity of the airfoil. Ships that I have built with such cross-sections have won every contest in which they have been entered.

Question. Should I use a high-lift airfoil?

Answer. Yes, I believe this is the proper thing to do. An airfoil should be used whose top surface has a maximum camber of one-eighth the cord. The lower surface should have a maximum camber of one-thirty-second the cord. By building a wing with a high-lift section, you will be able to get a greater amount (Continued on page 41)



The Curtiss-Wright "Osprey," a highly maneuverable 2-seat Pursuit, Observation, or Attack plane, has proven to be extremely popular in the export market. It gives an exceptional performance, having a top speed of 174 miles per hour and a climb of 1,620 feet per minute with full military load.

Its armament includes a fixed machine gun firing through the propeller and a flexible machine gun mounted on the rear cockpit. The flexible gun can be fixed in any one of seven positions. It is so arranged that it is possible to fire vertically, or over the sides of the fuselage, affording a very large arc of fire.

This plane is also capable of carrying five 50 lb. bombs under each wing.

The "Osprey" is powered by a 420 h.p. 9-cylinder Wright Whirlwind R-975E engine, the latest model.

Its length is 23' 2", height 9' 1 1/2", wing span 31' and wing area 244 sq. ft.



# THE AERODYNAMIC DESIGN OF THE MODEL PLANE

## A Complete Summary of Basic Facts of Model Propeller Design for Your Ready Reference and Tables of Values for Factors of Design That Will Simplify Calculations

By Charles H. Grant

### Article 9 Chapter 2

**L**AST month you were given typical examples to solve, which pertained to the design of the propeller. One was solved by means of formulas that had been given previously, and the other was a similar problem which could be solved by using proper values selected from tables. As it was impossible to publish these tables in the last issue, you have had to wait for an explanation of the solution through the table method. However, I hope this time has not been wasted and that you have given some thought to the correct solution. If you have, the following explanation of the proper use of the tables will be fairly simple. At any rate, I am not disappointing you this month, for you will find these complete tables on the pages that follow.

#### How to Use the Tables

In order that you may understand clearly how to make use of the tables, suppose we restate the problem published at the end of the last instalment, and solve it by the table method.

##### Example.

You are designing a model of which the following factors are known:

1. The wing area is 100 square inches.
2. The propeller is to be 8 inches in diameter.
3. The propeller is to have a pitch of 12 to 13 inches.
4. The model is to be able to climb at an angle of about (10) degrees, a medium low angle of climb.

The propeller must be of a certain design in order that the model will function in the desired manner.

The facts that you wish to know in order to be able to build such a machine are:

- (A) The proper amount of blade area for the propeller.
- (B) The dimensions of the block from which you can carve a propeller of 8" diameter (12) to (13) inch pitch, and sufficient blade area to be assured of the desired performance.

**T**HE procedure is as follows:

(1) From Table No. 1, determine the proportion of depth to width, of block, for a propeller of 8 diameter and (12-13) inch pitch.

In the left hand vertical column you will find the diameters listed. Follow out to the right horizontally from the 8 inch diameter notation until you find the pitch for which you are looking. Then note the (d-w) ratio at the head of the vertical column in which the figure of the desired pitch is located. In this case, the (d-w) ratio is (1-2). In other words, the width of the block should be twice the depth.

(2) Now in Table No. 2, locate the vertical column in which, (d-w)=(1-2), or in which the desired depth, width, ratio is located. Proceed along this column to the

horizontal column in which the desired angle of climb, of 10 degrees, is situated. The figure at the intersection of the two columns is the proper amount of propeller blade area to use. In this case it should be (7.92) per cent of the wing area or (7.92) per cent of 100 square inches, which is (7.92) square inches in terms of percentage of wing area.

(3) The third step is to examine tables No. 3, selecting the one for the required diameter of 8 inches, and locate the figure in the table that is nearest in value to the required blade area of (7.92) inches. Note both the vertical and horizontal column in which it is located. If the depth, as indicated by the dimension at the left end of the horizontal column, is the desired proportion of the width, i.e., (1-2), as indicated by the dimension at the top of the vertical column, you have then selected the proper value, and the depth and width of the block should be equal to the dimensions given at the left of the horizontal column and the top of the vertical column, respectively. If, however, these dimensions are not in the right proportion of (1) and (2), then you must determine which values of

the depth and the width given in the table at the heads of the columns are in this proportion. You can then select the blade area value

common to any one of these sets of horizontal and vertical columns of (1-2) ratio which is nearest to the required value of

(7.2) square inches. The depth and width of the propeller block from which the propeller may be cut, will be indicated at the left and top of the table.

In this case, the value given in the 8" diameter table which is nearest to the desired blade area and of a (d-w) ratio of (1-2) is either (7.75) or (8.42) square inches. One is in the vertical column headed by (1½) and in the horizontal column headed by (¾). The larger value is in the vertical column headed by (1½) and in the horizontal column headed by (13/16). Choose which you desire. The width of our block should then be (1½) and the depth (¾) or the width (1½) and the depth (1-3/16) inches. The length of the block should be equal to the propeller diameter you have chosen, i.e. (8) inches. The larger values will give a climbing angle of a little over 10 degrees and the small values an angle of a little less than 10 degrees. If the required area is not shown in the table for the chosen diameter, change the diameter as required.

#### Summary

**F**OLLOWING is a complete summary of the important points of propeller design. Given, as they are, in condensed form, these facts should prove valuable to the model designer, for they may be referred to easily and quickly to obtain necessary information, without taking the time to read at length the detailed explanation given previously.

- (1) A propeller is a combination of two aerofoils disposed at similar angles of attack and radiating out from a central hub, which rotates in a plane, perpendicular to the line of motion forward, about or on a shaft through the center of the hub.
- (2) There are two types of propellers, "Helical" and "Straight Pitch."
- (3) Helical type is most efficient (gives greater thrust for the power required to drive it). The angle of the blade to the plane of rotation, grows gradually smaller, proceeding from the hub towards the blade tips.
- (4) The "Straight Pitch" propeller has the same blade angle from hub to tip of blade.
- (5) The three factors of design of Propeller are Diameter, Pitch and Area.
- (6) The diameter of a propeller is the diameter of the circle described by the tip of the blade as it revolves.
- (7) Limits of Diameter are, from



Gordon Light of Lebanon, Pa., carefully designed his propeller for the record-breaking plane he is holding, by means of the formulas and data given in these articles. His ship flew officially for 25 minutes and 53 seconds, covering a distance of eight miles, and establishing a world record



- (1/3) the wing span to (1/2) the wing span.
- (8) The Pitch may be Actual Pitch or Theoretical Pitch.
- (9) The Theoretical Pitch is the distance the propeller would screw itself forward in one revolution, if the blades pass through the air, as they revolved, at zero degrees angle of attack, and the chord of the blades is parallel to the line of motion (or the relative wind). The tables show the Theoretical Pitch.
- (10) The Actual Pitch is the actual distance the propeller screws itself forward in one revolution. This is usually less than the Theoretical Pitch by about (25) per cent.
- (11) The "Slip" is the difference between the Theoretical Pitch and the Actual Pitch.
- (12) Limits of pitch are, from (once) the diameter to (twice) the diameter, as Diam. (10"), Pitch (20").
- (13) The formula for Propeller Pitch, (P) is given by the following formula, in terms of the Propeller diameter, the depth (d), and the width (w), of the block from which it is to be cut. All dimensions should be in inches.

$$P = \frac{dD}{w}$$

- (14) The Area of the Propeller Blades may be determined from the dimensions of the block from which it is cut, by means of this formula:

$$a = \frac{\sqrt{(d)^2 + (w)^2} + d}{2} (0.4)D$$

d—Depth, w—Width, D—Diameter or Length. All values in inches.

- (15) The amount of blade area on any given machine determines the angle of climb.
- (16) The amount of Blade Area required for any given propeller (Pitch-Diameter) Ratio, is proportional approximately to the Wing Area for any given camber and angle of incidence.
- (17) The Blade Area required for the average model for average conditions of flight is from (10) per cent to (15) per cent of the total area of the lifting surfaces.
- (18) In order to change the propeller on a model, which gives a satisfactory condition of climbing angle, to one giving the same performance in this respect, but of a different pitch and diameter, use the following formula:

$$a_2 = a_1 \frac{\sqrt{P_2^3} \times \sqrt{D_1^3}}{\sqrt{P_1^3} \times \sqrt{D_2^3}}$$

Where  $a_1$ ,  $P_1$ , and  $D_1$ , are the "Old Propeller Characteristics" and  $a_2$ ,  $P_2$ ,  $D_2$ , are the new ones.

- (19) The Blade Area required for horizontal flight, with no climb, for a model, with a propeller of the average pitch-diameter ratio of (1½) to (1), and with a wing whose camber is 1/12 and angle of incidence (2) degrees, is (3.64) per cent of the wing area. (These are average conditions.)

- (20) The Required Additional Blade Area for each desired degree of climbing angle, with the conditions stated above, is (0.428) square inches.

- (21) The Required Blade Area for a model with a single surface wing whose camber is (1/12) and angle of incidence (2) degrees and with a propeller of a pitch diameter ratio of (1½) to (1), (average conditions), is given by the following simple formula, in per cent of wing area,

$$a = \frac{(3.6)A + (0.414)U}{100}$$

For the value of (a) required for this same wing when it is of the double surface type, multiply the quantity (3.6) A, in the equation by (3/4). For Double Surface Wings the equation is then,

$$a = \frac{(2.7)A + (0.414)U}{100}$$

- (22) A Simple Approximate Formula for the Required Value of (a) given in per cent of wing area, when the wing is of the single surface type, with a camber of (1/12) and an angle of incidence of (2) degrees, is as follows:

$$a = \frac{[(3.6)A + (0.414)U]\sqrt{P^3}}{100\sqrt{(1.5D)^3}}$$

This gives the value of (a) for any propeller pitch and diameter. For double surface wings, the quantity (3.6) A of the formula should be changed to (2.7) A.

- (23) The Actual Blade Area in square inches necessary for any angle of climb, may be determined by the following formulas, for any model you may care to design. For single surface wings:

$$a = \frac{AP^2(1/3+8C)(4+I)(1+\frac{U}{8.5})}{160D\sqrt{(2D)^2+P^2}}$$

For double surface wings:

$$a = \frac{AP^2(1/3+6C)(4+I)(1+\frac{8.5}{U})}{160D\sqrt{(2D)^2+P^2}}$$

THIS completes our chapter on the design of the model propeller. If it has been a little involved it has been because of the fact that propeller design is a very complicated problem and one which involves mathematics to a high degree. However, I hope that this treatise on the subject has helped to increase your understanding of it.

Next month the most important problem in aviation will be taken up; that is, STABILITY.

### Pitch Tables

No. 1.

The following tables give the propeller theoretical pitch in terms of the dimensions of the "block" from which the propeller is carved. At the heads of the columns, the ratios of depth to width of block are given. At the left the propeller diameter or block length is indicated. The values shown in the tables are the pitches for the various dimension ratios indicated.

The formula by means of which the

values are calculated, is as follows:

$$\frac{d}{w} = \frac{P}{\pi D}, \text{ or } P = \frac{d \pi D}{w}$$

d = Block Depth.

D = Block Length, or propeller diameter.

P = Propeller Pitch.

w = Block Width.

$\pi = 3.1416$ .

Diam.	d-w 1-3	d-w 1-2½	d-w 1-2¼	d-w 1-2	d-w 1-1½	d-w 1-1¼
6"	6.4	7.6	8.45	9.5	10.9	12.6
7"	7.33	8.8	9.8	11.	12.6	14.7
8"	8.36	10.	11.16	12.6	15.4	16.7
9"	9.43	11.5	12.6	14.15	16.2	18.9
10"	10.45	12.6	14.	15.75	18.	21.
11"	11.5	13.8	15.4	17.3	19.8	23.
12"	12.56	15.	16.75	18.9	21.6	25.2

Diam.	d-w ¾-2½	d-w ¾-2¼	d-w ¾-2	d-w ¾-1½	d-w ¾-1¼	d-w ¾-1
6"	6.65	7.4	8.3	9.54	11.	13.2
7"	7.7	8.57	9.62	11.	12.9	15.4
8"	8.75	9.76	11.	13.5	14.6	17.6
9"	10.05	11.	12.4	14.2	16.5	19.8
10"	11.	12.25	13.8	15.75	18.4	22.
11"	12.1	13.5	15.13	17.4	20.1	24.2
12"	13.1	14.65	16.54	18.9	22.	26.4

Diam.	d-w ¾-2½	d-w ¾-2	d-w ¾-1½	d-w ¾-1¼	d-w ¾-1	d-w ¾-¾
6"	6.35	7.12	8.2	9.44	11.3	14.2
7"	7.35	8.25	9.44	11.1	13.2	16.5
8"	8.37	9.44	11.6	12.5	15.1	18.8
9"	9.44	10.6	12.2	14.15	17.	21.2
10"	10.5	11.8	13.5	15.75	18.85	23.5
11"	11.6	13.	14.9	17.3	20.8	26.
12"	12.6	14.2	16.2	18.85	22.6	28.3

Diam.	d-w ¾-2	d-w ¾-1½	d-w ¾-1¼	d-w ¾-1	d-w ¾-¾	d-w ¾-½
6"	5.93	6.84	7.86	9.42	10.5	11.8
7"	6.88	7.86	9.25	11.	12.2	13.75
8"	7.86	9.67	10.4	12.6	14.	15.7
9"	8.84	10.2	11.8	14.15	15.73	17.65
10"	9.84	11.25	13.	15.75	17.45	19.6
11"	10.8	12.4	14.4	17.3	19.25	21.65
12"	11.82	13.5	15.7	18.84	21.	23.6

### Required Propeller Blade Area Tables No. 2.

The figures in the table give the necessary total propeller blade area in per cent of the total wing area, when the wings are the single surface type, for the conditions noted at the head of the columns and at the left of the tables. The values shown are true for an angle of incidence of (2) degrees, and a camber of (1-1/12) the chord.

To obtain correct values of (a), for wings of the double surface type with a camber of (1-1/12) the chord, multiply the value of (a) given in the tables by

$$\left( \frac{6.4 - U}{8.5 - U} \right)$$

To obtain proper values of (a) for other cambers, multiply the values given in the table by (1/3 + 8C), substituting the de-

sired value of (C), the camber, in the above quantity, as  $(\frac{1}{8})$  in place of (C).

At the top of the columns, the pitch-diameter ratios, and the corresponding block depth-width ratios are given.

The angles of climb, corresponding to the various values of blade area, are shown at the left.

Table values have been calculated from

regular blade area formula for single surface wings already given.

Where  $A = 100$ , and (a) = Propeller Blade Area in per cent of total wing area.

In order to calculate the value for (a) when the wings are double surfaced, use the formula given for double surface wings, where (C) is the height of the top surface camber in fractions of the chord.

### Blade Area and Block Size Tables No. 3.

These tables give the area the propeller blades will be, when cut from blocks of various dimensions. A separate table is given for the various diameters that you may care to use. The dimensions given in the left hand vertical column indicate the DEPTH of the block. The dimensions given in the horizontal row at the top, show the WIDTHS.

For instance in the table for (6") diameters: if a blade area of 4.08 is required, this area, which appears at the bottom of row number two, can be gotten by cutting the propeller from a block  $(\frac{3}{8})$  inches deep by  $(\frac{7}{8})$  inches wide, by six inches long.

TABLE FOR 6" DIAMETERS

Depth in Inches	Width in Inches				
	$\frac{3}{8}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{2}$
$\frac{3}{8}$	2.69	2.98	3.27	3.56	3.86
$\frac{7}{8}$	2.91	3.19	3.47	3.76	4.04
$\frac{1}{2}$	3.14	3.41	3.68	3.97	4.23
$\frac{5}{8}$	3.37	3.63	3.89	4.16	4.43
$\frac{1}{4}$	3.60	3.85	4.11	4.42	4.64
$\frac{3}{16}$	3.85	4.08	4.33	4.60	4.86

TABLE FOR 7" DIAMETERS

Depth in Inches	Width in Inches					
	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$
$\frac{3}{8}$	3.72	4.05	4.38	4.71	5.04	5.37
$\frac{7}{8}$	3.98	4.30	4.62	4.94	5.26	5.58
$\frac{1}{2}$	4.24	4.54	4.85	5.17	5.48	5.80
$\frac{9}{8}$	4.49	4.80	5.11	5.41	5.71	6.03
$\frac{5}{8}$	4.76	5.05	5.35	5.65	5.95	6.26
$\frac{11}{8}$	5.03	5.32	5.61	5.91	6.21	6.51
$\frac{3}{4}$	5.32	5.60	5.89	6.18	6.48	6.78
$\frac{13}{8}$	5.62	5.89	6.18	6.46	6.76	7.06

TABLE FOR 8" DIAMETERS

Depth in Inches	Width in Inches					
	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{3}{4}$
$\frac{1}{2}$	5.19	5.54	5.91	6.26	6.63	7.00
$\frac{9}{8}$	5.49	5.84	6.19	6.53	6.89	7.24
$\frac{5}{8}$	5.77	6.11	6.46	6.80	7.16	7.51
$\frac{11}{8}$	6.08	6.41	6.76	7.10	7.44	7.78
$\frac{3}{4}$	6.40	6.73	7.07	7.41	7.75	8.09
$\frac{13}{8}$	6.73	7.06	7.39	7.73	8.06	8.42
$\frac{7}{8}$	7.07	7.39	7.72	8.06	8.38	8.74
1	7.72	8.03	8.34	8.65	8.96	9.27

TABLE FOR 9" DIAMETERS

Depth in Inches	Width in Inches					
	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{4}$	2
$\frac{3}{8}$	7.28	7.69	8.10	8.51	8.92	9.73
$\frac{11}{8}$	7.61	8.02	8.42	8.83	9.24	10.06
$\frac{5}{8}$	7.95	8.36	8.75	9.15	9.56	10.38
$\frac{13}{8}$	8.30	8.70	9.09	9.47	9.88	10.69
$\frac{7}{8}$	8.65	9.04	9.43	9.80	10.20	11.00
1	9.36	9.74	10.12	10.46	10.85	11.65
$1\frac{1}{8}$	10.07	10.44	10.80	11.12	11.50	12.30
$1\frac{3}{8}$	10.78	11.14	11.48	11.78	12.15	12.95

(Continued on page 38)

Angle of Climb	Degrees	P = 1.045D d-w $1\frac{1}{8}-3\frac{1}{4}$	P = 1.18D d-w $1\frac{1}{4}-3$	P = 1.286D d-w $1\frac{1}{4}-2\frac{3}{4}$	P = 1.415D d-w $1\frac{1}{4}-2\frac{1}{4}$	P = 1.57D d-w $1\frac{1}{4}-2\frac{1}{4}$	P = 1.77D d-w $1\frac{1}{4}-2$	P = 1.88D d-w $1\frac{1}{4}-1\frac{1}{4}$	P = 2.02D d-w $1\frac{1}{4}-1\frac{1}{4}$
No Climb	0	1.84	2.33	2.60	3.06	3.64	4.39	4.84	5.38
Slight climb	5	2.92	3.70	4.14	4.86	5.79	6.98	7.70	8.55
Med. Low	10	4.01	5.07	5.66	6.66	7.92	9.56	10.53	11.70
Med. High	15	5.18	6.46	7.20	8.48	9.83	12.17	13.40	14.90
High	25	7.25	9.18	10.24	12.05	14.35	17.30	19.07	21.18
Extreme	35	9.43	11.94	13.31	15.68	18.65	22.50	24.92	27.55

d =  $1\frac{1}{8}$  I = 2° C<sub>s</sub> =  $\frac{1}{16}$

Angle of Climb	Degrees	Low		Med.						High
		P = 1.04D d-w 1-3	P = 1.32D d-w 1-2 $\frac{1}{2}$	P = 1.39D d-w 1-2 $\frac{1}{4}$	P = 1.57D d-w 1-2	P = 1.68D d-w 1-1 $\frac{1}{2}$	P = 1.8D d-w 1-1 $\frac{1}{4}$	P = 1.93D d-w 1-1 $\frac{1}{8}$	P = 2.1D d-w 1-1 $\frac{1}{8}$	
No Climb	0	1.84	2.62	3.01	3.64	4.06	4.51	5.24	5.70	
Slight	5	2.92	4.16	4.78	5.79	6.46	7.18	8.34	9.07	
Med. Low	10	4.01	5.70	6.55	7.92	8.84	9.82	11.40	12.40	
Med. High	15	5.10	7.76	8.34	9.83	11.25	12.50	14.51	15.78	
High	25	7.25	10.31	11.87	14.35	16.00	17.77	20.63	22.45	
Extreme	35	9.43	13.40	15.80	18.65	2.800	23.10	26.82	29.20	

d = 1 I = 2° C<sub>s</sub> =  $\frac{1}{16}$

Angle of Climb	Degrees	Low		Med.						High
		P = 1.1D d-w $\frac{7}{8}-2\frac{1}{4}$	P = 1.22D d-w $\frac{7}{8}-2\frac{1}{2}$	P = 1.375D d-w $\frac{7}{8}-2$	P = 1.57D d-w $\frac{7}{8}-1\frac{3}{4}$	P = 1.69D d-w $\frac{7}{8}-1\frac{1}{2}$	P = 1.835D d-w $\frac{7}{8}-1\frac{1}{4}$	P = 2D d-w $\frac{7}{8}-1\frac{1}{8}$	P = 2.2D d-w $\frac{7}{8}-1\frac{1}{8}$	
No Climb	0	1.98	2.40	2.93	3.64	4.09	4.66	5.30	6.18	
Slight	5	3.14	3.82	4.66	5.79	6.51	7.41	8.42	9.84	
Med. Low	10	4.31	5.22	6.37	7.92	8.90	10.15	11.54	13.44	
Med. High	15	5.49	6.65	8.12	9.83	11.33	12.90	14.68	17.12	
High	25	7.80	9.46	11.54	14.35	16.10	18.36	20.88	24.35	
Extreme	35	10.12	12.30	15.00	18.65	20.92	23.85	27.15	31.62	

d =  $\frac{7}{8}$  I = 2° C<sub>s</sub> =  $\frac{1}{16}$

Angle of Climb	Degrees	Low		Med.						High
		P = 1.045D d-w $\frac{3}{4}-2\frac{1}{4}$	P = 1.175D d-w $\frac{3}{4}-2$	P = 1.345D d-w $\frac{3}{4}-1\frac{3}{4}$	P = 1.57D d-w $\frac{3}{4}-1\frac{1}{2}$	P = 1.71D d-w $\frac{3}{4}-1\frac{1}{4}$	P = 1.88D d-w $\frac{3}{4}-1\frac{1}{8}$	P = 2.1D d-w $\frac{3}{4}-1\frac{1}{8}$	P = 2.35D d-w $\frac{3}{4}-1$	
No Climb	0	1.84	2.23	2.816	3.64	4.165	4.84	5.70	6.71	
Slight	5	2.92	3.55	4.47	5.79	6.63	7.70	9.07	10.67	
Med. Low	10	4.01	4.85	6.13	7.92	9.07	10.53	12.40	14.60	
Med. High	15	5.10	6.18	7.80	9.83	11.54	13.40	15.78	18.58	
High	25	7.25	8.79	11.09	14.35	16.41	19.07	22.45	26.43	
Extreme	35	9.43	11.48	14.50	18.65	21.45	24.92	29.20	34.55	

d =  $\frac{3}{4}$  I = 2° C<sub>s</sub> =  $\frac{1}{16}$

Angle of Climb	Degrees	P = 1.045D d-w $\frac{5}{8}-1\frac{1}{8}$	P = 1.208D d-w $\frac{5}{8}-1\frac{1}{4}$	P = 1.31D d-w $\frac{5}{8}-1\frac{1}{2}$	P = 1.427D d-w $\frac{5}{8}-1\frac{3}{4}$	P = 1.57D d-w $\frac{5}{8}-1\frac{1}{2}$	P = 1.745D d-w $\frac{5}{8}-1\frac{1}{4}$	P = 1.963D d-w $\frac{5}{8}-1$	P = 2.243D d-w $\frac{5}{8}-\frac{3}{4}$
No Climb	0	1.84	2.30	2.69	3.11	3.64	4.29	5.16	6.31
Slight	5	2.92	3.66	4.28	4.95	5.79	6.82	8.21	10.15
Med. Low	10	4.01	5.01	5.86	6.77	7.92	9.34	11.26	13.71
Med. High	15	5.10	6.37	7.45	8.62	9.83	11.88	14.30	17.44
High	25	7.25	9.06	10.60	12.25	14.35	16.90	20.34	24.81
Extreme	35	9.43	11.78	13.87	15.93	18.65	21.98	26.41	32.25

d =  $\frac{5}{8}$  I = 2° C<sub>s</sub> =  $\frac{1}{16}$



## Our SPECIAL "Get Acquainted OFFER!"

# BIG 10c Tube 'Dri-Qwik' CEMENT—

MODEL BUILDERS OF AMERICA! To show our interest in you model builders and to introduce our quality line of supplies, we will allow you to purchase three (3) tubes of our secret, new "Dri-Qwik" Cement at 5c per tube—HALF the usual price! But you must act immediately as this "Get-Acquainted" Offer expires at midnight, November 10th. Our new, secret, cement-

formula promises you the best model airplane cement you ever used. It is clear, extremely lightweight, dries quick, holds tight, easy to use, and is economical. Made and intended solely for model building! Please NOTE: That no order for cement will be accepted without an additional order of at least 25c worth of model airplane supplies. Now order—and SAVE MONEY!

Not more  
than 3  
Tubes to a  
customer

# 5c

**This Offer Good Only Till Midnight, November 10 - Order Now!**

A Group of Progressive Business Men Have Joined Hands To Create This NEW Company For The Purpose of Giving The Model Builders of America Not Only Splendid Quality . . . Not Only Bargain Prices . . . Not Only Fast, Business-Like Service—but to Also GUARANTEE Full Satisfaction or Refund Your Money!

### HOW IT STARTED

One evening a group of *business men*—all model airplane enthusiasts—were discussing their hobby at the home of a mutual friend. During their conversation, one of the group said: "Why not pool our business brains, experience, and model airplane interest together with our adequate capital, in organizing a company whose biggest aim shall be to SERVE THE MODEL BUILDERS OF AMERICA!" He continued: "By this I mean to give builders the best quality supplies possible, at the most reasonable prices, to give them the quickest, most efficient service, and above all, to absolutely GUARANTEE that all supplies sold shall be satisfactory to the buyer, or an exchange will be made, or the customer's money will be promptly refunded!" The idea was discussed thoroughly—and O.K.'d! The best possible machinery was installed, skilled workmen were hired, a business-like, efficient system was created . . . the best of merchandise was purchased. NOW we invite you—we URGE you—to order at once and enjoy the experience of doing business with a modern business organization!

Actual  
Photo  
Shows  
Full  
Size  
Tube!



#### BALSA STRIPS

24" Lengths		
1/16" square, each	1c	12 for 5c
1/16 x 1/8", each	1c	10 for 5c
3/32" square, each	1c	9 for 5c
1/16 x 1/4", each	1c	8 for 5c
1/8" square, each	1c	8 for 5c
3/32 x 3/16", each	1 1/2c	8 for 8c
1/8 x 3/16", each	1 1/2c	8 for 8c
1/8 x 1/4", each	2c	5 for 7c
1/8 x 3/8", each	2c	5 for 7c
1/4 x 1/2", each	3c	5 for 10c
3/8" square, each	3c	5 for 10c
1/2 x 1/2", each	5c	5 for 20c
3/4" square, each	6c	5 for 25c
1 x 1", each	13c	4 for 45c

Other sizes to order.

#### BALSA STRIPS

36" Lengths		
1/8" square, each	2c	6 for 5c
1/8 x 1/4", each	2c	6 for 10c
3/16" square, each	2c	5 for 9c
1/4" square, each	3c	5 for 12c
1/2 x 3/8", each	3c	5 for 8c

#### SHEET BALSA

24"	36"
1/32 x 2", each	3c
1/16 x 2", each	4c
1/16 x 3", each	6c
1/16 x 4", each	9c
1/32 x 2", each	4 1/2c
1/8 x 2", each	6 1/2c
3/16 x 2", each	6c
1/4 x 2", each	11c

#### PROPELLER BLOCKS

3/8 x 1/2 x 6", each	1c	6 for 4c
1/2 x 3/4 x 6", each	1c	6 for 5c
9/16 x 1/2 x 7", each	2c	6 for 10c
3/4 x 1 1/2 x 8", each	3c	3 for 8c
7/8 x 1 1/2 x 8", each	4c	3 for 10c
3/4 x 1 1/2 x 8", each	5c	3 for 13c
3/4 x 1 1/2 x 10", each	6c	3 for 15c
1 x 1 1/2 x 8", each	7c	3 for 18c
1 x 1 1/2 x 10", each	9c	3 for 21c
1 x 1 1/2 x 12", each	9c	3 for 24c
1 x 1 1/2 x 12", each	10c	3 for 27c
1 1/2 x 1 1/2 x 12", each	13c	3 for 35c
2 x 2 x 12", each	17c	3 for 45c

#### PLANK BALSA

1 x 3 x 36", each	33c
1 x 6 x 36", each	35c
1 x 3 x 36", each	35c
2 x 6 x 36", each	89c
2 x 6 x 40", each	95c

#### JAPANESE TISSUE

White, 19x24", each	4c per sheet
Red, yellow, green, blue, black, orange, and khaki colored Jap tissue, 20 1/2 x 24", each	5c per sheet
	45c per doz.

#### BEST GRADE RUBBER

No. 20 sq. (.045")	3 ft. for 1c
1/32 x 1/16"	3 ft. for 1c
1/32 x 1/8"	3 ft. for 1c

#### BAMBOO

1/16x1/4x12"	1c ea. 6c per doz.
1/16x1/4x15"	1c ea. 8c per doz.
1/16 sq. x 12"	4 for 1c 36 for 8c

#### DRI-QWIK CEMENT

Large size tube	10c
Pint	65c

#### BANANA LIQUID

1 oz. bottle	7c
2 oz. bottle	16c
Pint	60c

#### ACETONE

2 oz. bottle	10c
Pint	75c

#### ALUMINUM TUBING

1/16" dia., per ft.	8c
3/32" dia., per ft.	8c
1/8" dia., per ft.	10c
3/16" dia., per ft.	11c
1/2" dia., per ft.	11c
3/8" dia., per ft.	13c

#### CELLULOID DUMMY MOTORS—9 cyl.

1 1/4" dia.	18c
2" dia.	22c
3" dia.	22c

#### STREAMLINED WHEEL PANTS

Large size to fit 1 1/4" and 1 1/2"	20c
Small size to fit 3/4" and 1"	15c

#### DOWEL RODS

1/16" dia., 24" long	8 for 5c
1/8" dia., 36" long	7 for 5c

#### THRUST BEARINGS

Small size	2c each; per dozen, 18c
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#### SHEET ALUMINUM

.006" thick, per sq. ft.	12c
.010" thick, per sq. ft.	18c

#### CELLULOID SHEETS

4 x 6"	3c
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#### WASHERS

Per doz.	5c
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#### PROPELLER SHAFTS

Pair	3c
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#### MUSIC WIRE

Straightened and cut to 2 foot lengths.	
.014"	.020"
.016"	.022"
.018"	.024"
.020"	.026"
.022"	.028"
.024"	.030"
.026"	.032"
.028"	.034"
.030"	.036"
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## SUPPLIES AT DEEP CUT PRICES

★ The Most Extensive Line of Highest Quality Materials at Prices That Defy the Keenest Competition! SUPER QUALITY Balsa SHEET Balsa

(20" Lengths)		(20" Lengths)	
1/16x1/16	20 for .05	1/64x1/64	20 for .08
1/16x1/32	20 for .05	1/32x1/32	20 for .08
1/16x1/8	20 for .05	1/20x1/20	20 for .08
3/32x1/32	20 for .05	1/16x1/16	20 for .08
1/8x1/8	20 for .05	3/32x1/32	20 for .12
1/8x1/16	20 for .09	1/8x1/8	20 for .10
1/8x1/4	20 for .12	1/4x1/4	20 for .11
3/16x1/16	20 for .13	PROP BLOC'S	
3/16x1/8	20 for .16	1/2x3/8x5	2 for .01
1/4x1/4	20 for .17	1/2x3/4x5	2 for .10
1/4x1/2	2 for .05	1/2x3/4x6	2 for .11
5/16x5/16	3 for .05	5/8x1/8	2 for .15
1/2x1/2	3 for .10	5/8x1/4	2 for .05
1/2x1	1 for .06	3/4x1/4x9	3 for .05
1 x 1	1 for .11	2/4x1/4x10	2 for .05
1 x 2	1 for .20	3/4x1/2x11	1 for .04
2 x 2	1 for .30	7/8x1/2x12	1 for .09
2 x 3	1 for .40	7/8x1/2x16	1 for .09
2 x 6	1 for .60	PLANKS	
3 x 2	1 for .50	2 x 3 x 36	45
		1 x 6 x 36	80
		2 x 6 x 36	80

### OTHER STAR MODEL SUPPLIES

SHEET ALUMINUM (12" wide)		ALUM. DRAG RINGS	
.002	per foot .12	1 1/2"	15 3/4" .25
.005	per foot .11	2"	17 3/4" .28
.010	per foot .13	2 1/2"	22 3/4" .53
WASHERS		ALUM. CROWNS	
Large or small .2	doz. .03	1 1/2"	15 3/4" .26
EYELETS		2"	17 3/4" .30
3 dozen	.10	2 1/2"	22 3/4" .35
DOUBLE GEARED WINDERS		BLACK CELLULOID PANTS	
Each	.25	Pair	.25
SANDPAPER		SMALL PANTS	
1 dozen sheets	.10	1 1/2" long for 1" and	
REED		3/4" wheels, pair	.14
1/32", 3/64", 1/16" diam.		BLACK CELLULOID COWLINGS	
6 feet .03		Each	.20
BAMBOO		ACETONE	
1/16 x 1/4 x 12, dozen	.07	2 oz.	.06; pt. .25
1/16 x 1/4 x 15, doz.	.08	COLORED DOPE	
1/16 square, 3 dozen	.05	Colors: Orange, red, green, silver, yellow, blue, black, white, buff, navy grey, mahogany, olive drab	
AIRPLANE INSIGNIA		1 oz. bottle	.06
Stars in circle or bullseye (red, white, blue)		2 oz. can .09; pt. .65	
1" diam.	8 for .05	COLORLESS CEMENT	
1 1/2" diam.	7 for .05	1 oz. bottle	.06
2 1/2" diam.	6 for .05	2 oz. can .09; pt. .65	
CELLULOID WHEELS		THRUST BEARINGS	
In all colors		Small and large sizes	
3/8"	per pr. .04	Each, .01 1/2; doz. .15	
1 1/2"	per pr. .06	CLEAR DOPE	
1 3/4"	per pr. .08	2 oz.	.07; pt. .37
3"	per pr. .25	PARA RUBBER	
DOUGHNUT		No rubber over 5 wheels old	
RUBBER WHEELS		1/16 flat	.50 foot .12
1" diam.	per pr. .13	225 feet	.50
1 1/2" diam.	per pr. .20	1/8 flat	.50 foot .13
1 3/4" diam.	per pr. .25	225 feet	.13
DUMMY MOTORS		3/16 flat	.50 foot .17
9 cylinder		225 feet	.17
1 1/4" diam.	each .16	JAPANESE TISSUE	
2" diam.	each .23	Red, blue, green, white, orange, brown, yellow	
3" diam.	each .29	low	5 sheets .10
ALUMINUM TUBING		MUSIC SPRING WIRE	
1/16" O.D.	per foot .05	.014, .020, .028,	
1/8" O.D.	per foot .06	.034	18 ft. .05
3/16" O.D.	per foot .08	BANANA OIL	
		2 oz.	.07; pt. .57
		Include 15 cents to all orders up to \$1.50. Orders of \$1.51 and over, add 10% for packing and postage. (Orders west of Mississippi, add 10 cents extra.) On all Canadian and foreign orders up to \$1.50, add 25c. On orders of \$1.51 and over, add 15% for packing and postage.	

**STAR.....★**  
**MODEL AERO SHOP**  
 10-12 Pearl St., Newark, N. J.

Here's a REAL Flying Model!

**CAPT. MOLLISON'S**  
**De HAVILLAND**  
**PUSS MOTH**

A Complete Kit to make a Lifelike 2 ft. Reproduction of the famous Trans-Atlantic Plane



What a beautiful plane and what flying ability it has. The kit is complete in every detail, including all material and full size blueprints.

Blueprint alone ..... 50c  
 Remit by Cash or Money Order only. Add 15% to all Canadian and foreign orders.  
**LAFAYETTE MODEL AIRPLANE CO.**  
 312 Fifth Avenue Brooklyn, N. Y.

**1.95**  
 postpaid

## Aerodynamic Design

(Continued from page 36)

TABLE FOR 10" DIAMETERS

Depth in Inches	Width in Inches					
	1 1/2	1 3/4	1 5/8	1 3/4	2	2 1/4
3/4	9.28	9.72	10.17	10.63	11.55	12.49
1 1/4	9.67	10.10	10.53	10.98	11.88	12.82
3/4	10.04	10.48	10.91	11.35	12.25	13.16
1	10.82	11.24	11.64	12.06	12.95	13.85
1 1/2	11.60	12.00	12.38	12.78	13.67	14.56
1 3/4	12.40	12.76	13.16	13.51	14.40	15.30
1 1/2	14.00	14.42	14.83	15.22	16.00	16.81

TABLE FOR 11" DIAMETERS

Depth in Inches	Width in Inches					
	1 1/2	1 3/4	1 5/8	1 3/4	2	2 1/4
3/4	10.20	10.70	11.18	11.70	12.71	13.72
1 1/4	10.62	11.11	11.60	12.09	13.07	14.11
3/4	11.05	11.52	12.00	12.49	13.46	14.48
1	11.90	12.35	12.81	13.28	14.25	15.24
1 1/2	12.76	13.18	13.65	14.10	15.03	16.02
1 3/4	13.63	14.05	14.48	14.95	15.85	16.83
1 1/2	15.40	15.85	16.30	16.76	17.60	18.50

TABLE FOR 12" DIAMETERS

Depth in Inches	Width in Inches					
	1 1/2	1 3/4	1 5/8	1 3/4	2	2 1/4
3/4	11.11	11.65	12.19	12.74	13.87	15.04
1 1/4	11.56	12.11	12.65	13.16	14.28	15.44
3/4	12.02	12.57	13.09	13.60	14.69	15.83
1	12.97	13.50	13.99	14.48	15.54	16.64
1 1/2	13.95	14.46	14.92	15.38	16.41	17.48
1 3/4	14.93	15.41	15.86	16.32	17.33	18.37
1 1/2	16.97	17.38	17.83	18.27	19.21	20.20

## How Well Do You Know Your Airplanes

(Continued from page 9)

ance and features of the various machines. His work was excellent.

The winner of the third award of \$2.00 is Mr. William Pinnell of 1319 Avenue L, Brooklyn, New York. Pinnell's answers were all correct and he gave a considerable amount of detail.

We wish to give honorable mention to the following contestants:

Douglas H. Gilmour of Brooklyn, New York.

Jarden McCorkle of Gladwyne, Pa.

G. Robert Knapp of White Plains, New York.

Richard Korns of Dayton, Ohio.

William Fraser of Brooklyn, New York.

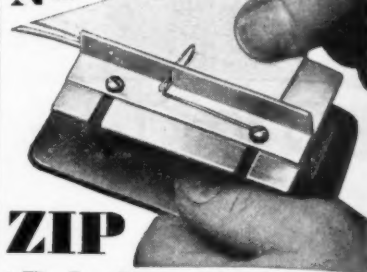
## Whats and What Notes

(Continued from page 8)

about one-half as high at the tips as they are at the inner wing ends. This taper shows on Fig. 5, the front view of the wing. Therefore, the nose end of each rib will be slightly smaller, this dimension being called B. Naturally, since we have a tapered wing, each rib will be lower over all, this dimension being A. A and B are taken from the front view. From the top

(Continued on page 40)

## NEW



## ZIP Balsa Wood Stripper

(Patent applied for)

Now you can cut your own strips of balsa wood or bamboo accurately and quickly in widths from 1/32" to 5/16". ZIP not only saves you money but makes model building more interesting. Beautifully made of polished cast aluminum—removable razor blade insures sharp cutting edge—has adjustable guide with spring tension—suction cups on base secure firmly to table. Most useful tool ever offered model builders.

PRICE **75c** Postpaid

Money back if not satisfied.

AGENTS WANTED

Make extra money by becoming our representative.

**AERO MODEL BUILDERS' GUILD**  
 233 Halsted Road Elizabeth, N. J.



## Now-Selley Wheels Cost Less!

The largest and lowest priced selection in the world

Aluminum Disc		Full Balloon	
Rubber Tired		Tired Alum.	
AIR WHEELS		Disc Wheels	
1" dia. 180 pr.	1 1/4" dia. 230 pr.	1 1/4" dia. 230 pr.	1 1/4" dia. 230 pr.
1 1/4" dia. 200 pr.	1 3/4" dia. 300 pr.	1 3/4" dia. 300 pr.	1 3/4" dia. 300 pr.
1 3/4" dia. 250 pr.	2" dia. 400 pr.	2" dia. 400 pr.	2" dia. 400 pr.
Treaded Rubber		Celluloid Un-	
Alumin. Disc		tired Wheels	
1-3/16 dia. 300 pr.	1 1/2" dia. 400 pr.	1 1/2" dia. 400 pr.	1 1/2" dia. 400 pr.
1 1/2" dia. 400 pr.	1 3/4" dia. 500 pr.	1 3/4" dia. 500 pr.	1 3/4" dia. 500 pr.
1 3/4" dia. 500 pr.	2" dia. 600 pr.	2" dia. 600 pr.	2" dia. 600 pr.
2" dia. 600 pr.	2 1/4" dia. 800 pr.	2 1/4" dia. 800 pr.	2 1/4" dia. 800 pr.
2 1/4" dia. 800 pr.	2 3/4" dia. 1000 pr.	2 3/4" dia. 1000 pr.	2 3/4" dia. 1000 pr.
2 3/4" dia. 1000 pr.	3" dia. 1200 pr.	3" dia. 1200 pr.	3" dia. 1200 pr.
3" dia. 1200 pr.	3 1/2" dia. 1500 pr.	3 1/2" dia. 1500 pr.	3 1/2" dia. 1500 pr.
3 1/2" dia. 1500 pr.	4" dia. 1800 pr.	4" dia. 1800 pr.	4" dia. 1800 pr.
4" dia. 1800 pr.	4 1/2" dia. 2000 pr.	4 1/2" dia. 2000 pr.	4 1/2" dia. 2000 pr.
4 1/2" dia. 2000 pr.	5" dia. 2200 pr.	5" dia. 2200 pr.	5" dia. 2200 pr.
5" dia. 2200 pr.	5 1/2" dia. 2400 pr.	5 1/2" dia. 2400 pr.	5 1/2" dia. 2400 pr.
5 1/2" dia. 2400 pr.	6" dia. 2600 pr.	6" dia. 2600 pr.	6" dia. 2600 pr.
6" dia. 2600 pr.	6 1/2" dia. 2800 pr.	6 1/2" dia. 2800 pr.	6 1/2" dia. 2800 pr.
6 1/2" dia. 2800 pr.	7" dia. 3000 pr.	7" dia. 3000 pr.	7" dia. 3000 pr.
7" dia. 3000 pr.	7 1/2" dia. 3200 pr.	7 1/2" dia. 3200 pr.	7 1/2" dia. 3200 pr.
7 1/2" dia. 3200 pr.	8" dia. 3400 pr.	8" dia. 3400 pr.	8" dia. 3400 pr.
8" dia. 3400 pr.	8 1/2" dia. 3600 pr.	8 1/2" dia. 3600 pr.	8 1/2" dia. 3600 pr.
8 1/2" dia. 3600 pr.	9" dia. 3800 pr.	9" dia. 3800 pr.	9" dia. 3800 pr.
9" dia. 3800 pr.	9 1/2" dia. 4000 pr.	9 1/2" dia. 4000 pr.	9 1/2" dia. 4000 pr.
9 1/2" dia. 4000 pr.	10" dia. 4200 pr.	10" dia. 4200 pr.	10" dia. 4200 pr.
10" dia. 4200 pr.	10 1/2" dia. 4400 pr.	10 1/2" dia. 4400 pr.	10 1/2" dia. 4400 pr.
10 1/2" dia. 4400 pr.	11" dia. 4600 pr.	11" dia. 4600 pr.	11" dia. 4600 pr.
11" dia. 4600 pr.	11 1/2" dia. 4800 pr.	11 1/2" dia. 4800 pr.	11 1/2" dia. 4800 pr.
11 1/2" dia. 4800 pr.	12" dia. 5000 pr.	12" dia. 5000 pr.	12" dia. 5000 pr.
12" dia. 5000 pr.	12 1/2" dia. 5200 pr.	12 1/2" dia. 5200 pr.	12 1/2" dia. 5200 pr.
12 1/2" dia. 5200 pr.	13" dia. 5400 pr.	13" dia. 5400 pr.	13" dia. 5400 pr.
13" dia. 5400 pr.	13 1/2" dia. 5600 pr.	13 1/2" dia. 5600 pr.	13 1/2" dia. 5600 pr.
13 1/2" dia. 5600 pr.	14" dia. 5800 pr.	14" dia. 5800 pr.	14" dia. 5800 pr.
14" dia. 5800 pr.	14 1/2" dia. 6000 pr.	14 1/2" dia. 6000 pr.	14 1/2" dia. 6000 pr.
14 1/2" dia. 6000 pr.	15" dia. 6200 pr.	15" dia. 6200 pr.	15" dia. 6200 pr.
15" dia. 6200 pr.	15 1/2" dia. 6400 pr.	15 1/2" dia. 6400 pr.	15 1/2" dia. 6400 pr.
15 1/2" dia. 6400 pr.	16" dia. 6600 pr.	16" dia. 6600 pr.	16" dia. 6600 pr.
16" dia. 6600 pr.	16 1/2" dia. 6800 pr.	16 1/2" dia. 6800 pr.	16 1/2" dia. 6800 pr.
16 1/2" dia. 6800 pr.	17" dia. 7000 pr.	17" dia. 7000 pr.	17" dia. 7000 pr.
17" dia. 7000 pr.	17 1/2" dia. 7200 pr.	17 1/2" dia. 7200 pr.	17 1/2" dia. 7200 pr.
17 1/2" dia. 7200 pr.	18" dia. 7400 pr.	18" dia. 7400 pr.	18" dia. 7400 pr.
18" dia. 7400 pr.	18 1/2" dia. 7600 pr.	18 1/2" dia. 7600 pr.	18 1/2" dia. 7600 pr.
18 1/2" dia. 7600 pr.	19" dia. 7800 pr.	19" dia. 7800 pr.	19" dia. 7800 pr.
19" dia. 7800 pr.	19 1/2" dia. 8000 pr.	19 1/2" dia. 8000 pr.	19 1/2" dia. 8000 pr.
19 1/2" dia. 8000 pr.	20" dia. 8200 pr.	20" dia. 8200 pr.	20" dia. 8200 pr.
20" dia. 8200 pr.	20 1/2" dia. 8400 pr.	20 1/2" dia. 8400 pr.	20 1/2" dia. 8400 pr.
20 1/2" dia. 8400 pr.	21" dia. 8600 pr.	21" dia. 8600 pr.	21" dia. 8600 pr.
21" dia. 8600 pr.	21 1/2" dia. 8800 pr.	21 1/2" dia. 8800 pr.	21 1/2" dia. 8800 pr.
21 1/2" dia. 8800 pr.	22" dia. 9000 pr.	22" dia. 9000 pr.	22" dia. 9000 pr.
22" dia. 9000 pr.	22 1/2" dia. 9200 pr.	22 1/2" dia. 9200 pr.	22 1/2" dia. 9200 pr.
22 1/2" dia. 9200 pr.	23" dia. 9400 pr.	23" dia. 9400 pr.	23" dia. 9400 pr.
23" dia. 9400 pr.	23 1/2" dia. 9600 pr.	23 1/2" dia. 9600 pr.	23 1/2" dia. 9600 pr.
23 1/2" dia. 9600 pr.	24" dia. 9800 pr.	24" dia. 9800 pr.	24" dia. 9



## Build the World's Fastest Pursuit Plane

(Continued from page 23)

of the cockpit white and all fittings black in order that they may stand out. Instruments may be drawn on the dashboard if you wish.

The entire fuselage should be painted olive drab, as well as townsend ring, and landing gear fairings.

Paint the motor parts black, also tires of three wheels.

Wing, tail units, and hubs of wheels should be painted orange, also air speed indicator except for wires which are to be black. When paint on wing has dried, draw the insignias on the wing tips. Paint the star white, the small circle inside of it red, and the rest of the insignia blue. The horizontal stripes on the rudder should be red and white alternately while the vertical band should be blue. The lettering "XP-936" and "Boeing" should be printed in black on the rudder. Paint insignia on both sides of rudder and wing tips.

Paint the "prop" silver with a black shaft.

Paint flying lights black.

### Assembly (No. 1 plan)

First attach stub wings to fuselage, using plenty of ambroid. You may have to cut a little off the stub wings so they will fit fuselage snugly. Be accurate!

When ambroid has dried, connect rest of wing. Place blocks under tips to give the wing a three degree dihedral angle.

Next ambroid horizontal tail pieces in place and then fin and rudder. Look at the tail units from all angles to see that they are not crooked.

Install tail wheel in fairing, using half a pin as axle.

Then proceed to ambroid cylinders to nose and connect push rods. Cement townsend ring over motor by means of pegs between one or two cylinders.

Install wheels in "pants" with pins and ambroid landing gear to stub wing where it joins main wing. Connect all guy wires, which may be supplemented by black thread. Pins may be used in holding them to parts. Ambroid small strips of wood in place as shown in three-view layout to hold thread firmly. Paint these pieces black.

Ambroid air speed indicator on leading edge of wing and install fittings in cockpit.

Pin "prop" to nose and touch up all spots with paint. The plane will then be completed. You could not ask for a better replica of that speedy pursuit, the XP-936.

## Belgium's Greatest Ace

(Continued from page 21)

his foe, an Aviatik flying high some distance off to the east and immediately turned his Nieuport toward her in hot pursuit. When the German saw that his efforts to escape were futile he decided to turn and make a fight of it. Thiefly never gave him a chance to finish the maneuver, so fierce was his attack. Round after round of machine gun bullets burst into the Boche ship. She completed half the turn her pilot had put her into, shuddered as if feeling the impending disaster and then went into a nose dive from about 11,000 feet.

Thiefly started to follow her down still pumping lead into her tail. It was his first

(Continued on page 43)

## FREE! Selley \$10.00 OFFERS TO LUCKY BOYS FOR LUCKY ORDER NUMBERS!

### RULES.

1. Any boy is eligible.
2. Send in an order to Selley or make your own hand made order blank.
3. The name and order number of every boy will be placed on slips of paper and thrown into a box. Once a month SELLEY will draw 5 slips. The boy whose name and number is on the first slip will receive a credit check entitling him to \$5 worth of SELLEY merchandise. (Unrestricted choice.) The boy whose number is drawn second will receive a credit check for \$2. The next three boys will get credit checks of \$1 each.
4. The names and numbers of the winners will be published in our future advertisements.
5. Orders which are received too late for this month's drawing will be eligible for next month. This contest continues until further notice.

- 1st Prize \$5  
2nd Prize \$2  
3rd Prize \$1  
4th Prize \$1  
5th Prize \$1

BOYS! Here's the contest you've been looking for! NOTHING TO WRITE—NO WORK TO DO. Just send your order to SELLEY and you're eligible for your share of the \$10. And think of it! Your prize entitles you to your choice of the world's finest model airplane supplies. But don't delay. SEND IN YOUR ORDER TODAY TO BE ELIGIBLE FOR THIS MONTH'S PRIZE DRAWING! Be sure to look for your name in our future advertisements.

## THREE SURE WINNERS Selley Flying Model Kits

### The AIRBUS

Complete Kit  
NOW only  
**\$2.00**



Postage 25c.

An authentic model of Bellanca's latest and best transport plane. Here's a scale reduction model that you will be proud to own and exhibit. Its unusual lines give it a powerful appeal for the most expert craftsman. Yet it is simple enough in construction so that even a beginner can build it. As a flying model, it will distinguish itself for its beautiful and realistic appearance in flight. 29" wing span.

## SKYROCKET

Complete Kit  
NOW only  
**\$1.50**

Postage 25c.



Plans alone  
50c each

You will like the smart, unusual lines of this dandy little model. It has been tested by our factor, experts and found to be a capable and consistent flyer, forasmuch considering the short, stubby fuselage. 18" wing span.

These models represent the world's best in beautiful design and sound construction. The results exceeded even our own high expectations. Each kit contains all parts and materials for either an exact scale-reduction or flying-scale model and the clearly drawn plans and complete building directions show you every detail of construction for either type of model.

## SELLEY'S Curtiss-Wright FALCON

Complete Kit  
NOW only  
**\$1.75**

postpaid  
West of  
Mississippi or  
Canada 15c extra.  
Plans alone  
Only 25c.



This is the only model of its kind that is approved officially by CURTISS-WRIGHT. Capable of flying 400 feet, this exceptional model offers a kit which contains many new and original features of construction including complete full-sized plans, selected materials, dope, cement, colored insignias and special parts. 18" wing span.

## SELLEY Leads in Values!

## PROPELLERS CAST METAL

SPINNER TYPE STANDARD STEEL TYPE

### PROPELLERS—CAST METAL

2 bladed	3 bladed	2 bladed	3 bladed
3 1/2" .25	4" .35	3 1/2" .20	4" .30
4" .35	4 1/2" .45	4" .25	4 1/2" .35
5" .40	5" .50	5" .30	5" .45
6" .45	6" .60	6" .35	6" .50
7" .50	7" .70	7" .40	7" .55
8" .55	8" .80	8" .45	8" .60
9" .60	9" .90	9" .50	9" .65
10" .65	10" 1.00	10" .55	10" .70
11" .70	11" 1.10	11" .60	11" .75
12" .75	12" 1.20	12" .65	12" .80
13" .80	13" 1.25	13" .70	13" .85
14" .85	14" 1.30	14" .75	14" .90
15" .90	15" 1.35	15" .80	15" .95
16" .95	16" 1.40	16" .85	16" 1.00
17" 1.00	17" 1.45	17" .90	17" 1.05
18" 1.05	18" 1.50	18" .95	18" 1.10
19" 1.10	19" 1.55	19" 1.00	19" 1.15
20" 1.15	20" 1.60	20" 1.05	20" 1.20

The following sizes are supplied with adjustable blades with special hub, clamping rings and safety screws.

15" .50	15" .70	15" .80	15" .90	15" 1.00
16" .55	16" .75	16" .85	16" .95	16" 1.05
17" .60	17" .80	17" .90	17" 1.00	17" 1.10
18" .65	18" .85	18" .95	18" 1.05	18" 1.15
19" .70	19" .90	19" 1.00	19" 1.10	19" 1.20
20" .75	20" .95	20" 1.05	20" 1.15	20" 1.25

Packing and Postage 3c each up to 6" dia., 6c each up to 12" dia., 12c each up to 24" dia.

### Spun Aluminum Cowls



Diameter	Anti-frag	Open Cowl	Closed Cowl
1 1/2" .20	.20	.20	.20
2" .25	.25	.25	.25
2 1/2" .30	.30	.30	.30
3" .35	.35	.35	.35
3 1/2" .40	.40	.40	.40
4" .45	.45	.45	.45
4 1/2" .50	.50	.50	.50
5" .55	.55	.55	.55
5 1/2" .60	.60	.60	.60
6" .65	.65	.65	.65
6 1/2" .70	.70	.70	.70
7" .75	.75	.75	.75
7 1/2" .80	.80	.80	.80
8" .85	.85	.85	.85
8 1/2" .90	.90	.90	.90
9" .95	.95	.95	.95
9 1/2" 1.00	1.00	1.00	1.00
10" 1.05	1.05	1.05	1.05
10 1/2" 1.10	1.10	1.10	1.10
11" 1.15	1.15	1.15	1.15
11 1/2" 1.20	1.20	1.20	1.20
12" 1.25	1.25	1.25	1.25
12 1/2" 1.30	1.30	1.30	1.30
13" 1.35	1.35	1.35	1.35
13 1/2" 1.40	1.40	1.40	1.40
14" 1.45	1.45	1.45	1.45
14 1/2" 1.50	1.50	1.50	1.50
15" 1.55	1.55	1.55	1.55
15 1/2" 1.60	1.60	1.60	1.60
16" 1.65	1.65	1.65	1.65
16 1/2" 1.70	1.70	1.70	1.70
17" 1.75	1.75	1.75	1.75
17 1/2" 1.80	1.80	1.80	1.80
18" 1.85	1.85	1.85	1.85
18 1/2" 1.90	1.90	1.90	1.90
19" 1.95	1.95	1.95	1.95
19 1/2" 2.00	2.00	2.00	2.00
20" 2.05	2.05	2.05	2.05
20 1/2" 2.10	2.10	2.10	2.10
21" 2.15	2.15	2.15	2.15
21 1/2" 2.20	2.20	2.20	2.20
22" 2.25	2.25	2.25	2.25
22 1/2" 2.30	2.30	2.30	2.30
23" 2.35	2.35	2.35	2.35
23 1/2" 2.40	2.40	2.40	2.40
24" 2.45	2.45	2.45	2.45
24 1/2" 2.50	2.50	2.50	2.50
25" 2.55	2.55	2.55	2.55
25 1/2" 2.60	2.60	2.60	2.60
26" 2.65	2.65	2.65	2.65
26 1/2" 2.70	2.70	2.70	2.70
27" 2.75	2.75	2.75	2.75
27 1/2" 2.80	2.80	2.80	2.80
28" 2.85	2.85	2.85	2.85
28 1/2" 2.90	2.90	2.90	2.90
29" 2.95	2.95	2.95	2.95
29 1/2" 3.00	3.00	3.00	3.00

Packing and Postage 6c each on sizes up to 4" diameter. 10% of price of cowl on larger sizes.

## Dummy Machine Guns



Die Cast Metal Pursuit Type Gun 10c Swivel Type Gun 20c Postage 3c each.

## The Lowest Prices Ever Offered on Selley's Model Supplies!

LATE BALSA		1 1/2 x 1 1/2"		2" x 2"	
3/8" Lengths		1 1/2" x 1 1/2"		2" x 2"	
1/16x1/16"	16c..8 for 50	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
1/16x1/8"	16c..7 for 50	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
1/16x3/16"	15c..6 for 70	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
1/16x1/4"	15c..6 for 70	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
1/16x1/2"	4c..4 for 150	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
3/32x3/32"	16c..6 for 50	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
3/32x1/8"	16c..6 for 50	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
1/8 x 1/8"	16c..6 for 50	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
1/8 x 1/4"	15c..6 for 70	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
1/8 x 1/2"	20c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
3/16x3/16"	25c..5 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
3/16x1/4"	25c..5 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
3/16x1/2"	25c..5 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
1/4 x 1/4"	30c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
1/4 x 1/2"	30c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
1/2 x 1/2"	30c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
3/8 x 3/8"	30c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
1/2 x 1/2"	30c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
3/4 x 3/4"	35c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
1" x 1"	40c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
1 1/2 x 1 1/2"	45c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
2" x 2"	50c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
2 1/2 x 2 1/2"	55c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
3" x 3"	60c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
3 1/2 x 3 1/2"	65c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
4" x 4"	70c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
4 1/2 x 4 1/2"	75c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
5" x 5"	80c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
5 1/2 x 5 1/2"	85c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
6" x 6"	90c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
6 1/2 x 6 1/2"	95c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
7" x 7"	100c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
7 1/2 x 7 1/2"	105c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
8" x 8"	110c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
8 1/2 x 8 1/2"	115c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
9" x 9"	120c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
9 1/2 x 9 1/2"	125c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
10" x 10"	130c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
10 1/2 x 10 1/2"	135c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
11" x 11"	140c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
11 1/2 x 11 1/2"	145c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
12" x 12"	150c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
12 1/2 x 12 1/2"	155c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
13" x 13"	160c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
13 1/2 x 13 1/2"	165c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
14" x 14"	170c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
14 1/2 x 14 1/2"	175c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
15" x 15"	180c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
15 1/2 x 15 1/2"	185c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
16" x 16"	190c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
16 1/2 x 16 1/2"	195c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
17" x 17"	200c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
17 1/2 x 17 1/2"	205c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
18" x 18"	210c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
18 1/2 x 18 1/2"	215c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
19" x 19"	220c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
19 1/2 x 19 1/2"	225c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
20" x 20"	230c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
20 1/2 x 20 1/2"	235c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
21" x 21"	240c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
21 1/2 x 21 1/2"	245c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
22" x 22"	250c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
22 1/2 x 22 1/2"	255c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
23" x 23"	260c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
23 1/2 x 23 1/2"	265c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
24" x 24"	270c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
24 1/2 x 24 1/2"	275c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
25" x 25"	280c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
25 1/2 x 25 1/2"	285c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
26" x 26"	290c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
26 1/2 x 26 1/2"	295c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
27" x 27"	300c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
27 1/2 x 27 1/2"	305c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
28" x 28"	310c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
28 1/2 x 28 1/2"	315c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
29" x 29"	320c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
29 1/2 x 29 1/2"	325c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
30" x 30"	330c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
30 1/2 x 30 1/2"	335c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
31" x 31"	340c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
31 1/2 x 31 1/2"	345c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
32" x 32"	350c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
32 1/2 x 32 1/2"	355c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
33" x 33"	360c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
33 1/2 x 33 1/2"	365c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
34" x 34"	370c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
34 1/2 x 34 1/2"	375c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
35" x 35"	380c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
35 1/2 x 35 1/2"	385c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
36" x 36"	390c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
36 1/2 x 36 1/2"	395c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
37" x 37"	400c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
37 1/2 x 37 1/2"	405c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
38" x 38"	410c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
38 1/2 x 38 1/2"	415c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
39" x 39"	420c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
39 1/2 x 39 1/2"	425c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
40" x 40"	430c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
40 1/2 x 40 1/2"	435c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
41" x 41"	440c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
41 1/2 x 41 1/2"	445c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
42" x 42"	450c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
42 1/2 x 42 1/2"	455c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
43" x 43"	460c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
43 1/2 x 43 1/2"	465c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
44" x 44"	470c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
44 1/2 x 44 1/2"	475c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
45" x 45"	480c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
45 1/2 x 45 1/2"	485c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
46" x 46"	490c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
46 1/2 x 46 1/2"	495c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
47" x 47"	500c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
47 1/2 x 47 1/2"	505c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
48" x 48"	510c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
48 1/2 x 48 1/2"	515c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
49" x 49"	520c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
49 1/2 x 49 1/2"	525c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
50" x 50"	530c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
50 1/2 x 50 1/2"	535c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
51" x 51"	540c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
51 1/2 x 51 1/2"	545c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
52" x 52"	550c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
52 1/2 x 52 1/2"	555c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
53" x 53"	560c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
53 1/2 x 53 1/2"	565c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
54" x 54"	570c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
54 1/2 x 54 1/2"	575c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
55" x 55"	580c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
55 1/2 x 55 1/2"	585c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
56" x 56"	590c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
56 1/2 x 56 1/2"	595c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
57" x 57"	600c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
57 1/2 x 57 1/2"	605c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
58" x 58"	610c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
58 1/2 x 58 1/2"	615c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
59" x 59"	620c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50
59 1/2 x 59 1/2"	625c..6 for 100	1 1/2 x 1 1/2"	17c..8 for 50	2" x 2"	20c..8 for 50

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16" Balsa Strips		Bamboo	
1/16 x 1/16	.25 for .07	645 sq. ft. 12 for \$3.05	
1/16 x 1/8	.12 for .03	1/16x1/4x15" 12 for .01	
1/16 x 3/16	.20 for .05	1/16x1/4x15" 12 for .05	
1/8 x 1/8	.20 for .05		
1/8 x 3/16	.14 for .05		
1/8 x 1/4	.10 for .05		
3/16 x 3/16	.10 for .05		
1/4 x 1/4	.08 for .05		
1/2 x 1/2	.3 for .05		
1 x 1	.3 for .05		
18" Balsa Strips		Clear Dope—Thinner	
1 x 2	.1 for .15	2 ozs. .... \$0.07	
2 x 2	.1 for .15	1 oz. .... .13	
3 x 2	.1 for .25	1 Pint. \$.49 Quart. .75	
4 x 2	.1 for .45		
18" Balsa Planks		Colored Dope	
1 x 2	.1 for .15	White Red, Blue, Yellow, Orange, Olive Drab, Silver, Black, Green.	
2 x 2	.1 for .25	3 ozs. .... \$1.10	
3 x 2	.1 for .45	1 oz. .... .19	
4 x 2	.1 for .75	1 Pint. \$.65 Quart. 1.00	
18" Balsa Sheets		Colorless Cement	
1/22 x 2	.7 for \$1.0	Strongest fastest drying on the market.	
1/16 x 2	.7 for \$1.0	2 ozs. .... .70	
1/8 x 2	.4 for .12	1 oz. .... .35	
5/16 x 2	.4 for .15	1 Pint. \$.65 Quart. 1.00	
1/4 x 2	.4 for .15		
For 36" lengths double 18" length cost.		Finest Para Rubber	
5" .....	9 for \$0.5	1/32x1/32 .5 ft. for \$0.1	
6" .....	7 for .05	225 ft. skinn. .... .40	
7" .....	3 for .05	645 sq. ft. 3 ft. for .03	
8" .....	3 for .05	225 ft. skinn. .... .60	
10" .....	1 for .05	3/32 flat. .... 3 ft. for .01	
12" .....	1 for .04	1/8 dia. .... 3 ft. for .01	
15" .....	1 for .07	225 ft. skinn. .... .85	
18" .....	1 for .11	2/16 flat .... 2 ft. for .01	
Dummy Radial Engines		225 ft. skinn. .... .95	
(Celluloid, 6-cylinders)	1 1/2" diameter .... \$1.10		
3" diameter .... .30			
Straight Music Wire			
Sizes .014, .020, .025, .034, 6 ft. .... \$0.03			
Thrust Bearings (Small)			
Each .... \$0.01 1/2			
Per doz. .... .15			
Washers			
1/8 O. D. Per Doz. .... \$0.01			
Per Gross .... .05			
1/4 O. D. Per Doz. .... .01			
Per Gross .... .10			
Aluminum Lath			
(.0005 of an inch in thickness, 3 1/2" wide)	5 1/2" dia. .... Pair .05		
ft. for .... \$0.05	1 1/2" dia. .... Pair .07		
	3/4" dia. .... Pair .10		
	1 1/4" dia. .... Pair .14		

## HOW TO ORDER

No orders under 50c. Add 15c for packing and postage to orders under \$1.50. Orders over \$1.50 add 10 per cent. When ordering 36" lengths add extra 10c. Canada 10c extra. (Add 10c extra to cover postage on Free Rubber.)

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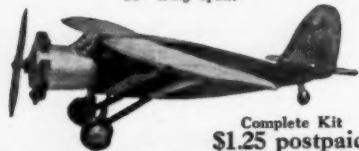
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18" wing span.



Complete Kit  
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The complete kit includes building instructions, full size 2 in 1 blueprint, printed ribs, bulkheads, etc., on balsa sheets, celluloid wheels, colored Japan paper, power plane and propellers for both type models, cement, dope, strips, photo blueprint of finished model, etc.

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Solid Scale Model—14" wing span.



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These models are exact reproductions, in every detail, of the original ships and were designed by Dr. Otto A. Koller, internationally known aeronautical engineer.

NEW YORK MODEL AIRPLANE CO.

1654 St. Johns Place, Brooklyn, N. Y.

## Whats and What Nots

(Continued from page 38)

view, Fig. 6, we get the rib lengths, or C. Fig. 7 shows a rib with these dimensions indicated. Fig. 8 shows how the ribs are laid out. S is your strip of sheet balsa. The dotted lines indicate the No. 1 rib which is cut out first and smoothed to the correct shape. The lines first drawn on the balsa are indicated, the dimensions D, E, and F being taken from the front and top views as explained before. We are, of course, now making the No. 2 rib. Place the cut out No. 1 rib over the lines and slide it along until the top curve or camber touches at the points indicated X. Then draw along the No. 1 top curve with a pencil. If your ribs have a bottom camber, the same procedure is followed, but you will have one more dimension to handle. Cut out the No. 2 rib and use it, not No. 1, to make No. 3. Proceed this way, using each rib to make the succeeding one. (See also August issue, page 14, Fig. No. 4.)

To assemble the wing, lay out the exact top view on a board. Pin down the leading and trailing edges and the extreme outer and inner ribs. The rear spar, being on the bottom, may also be put in place now. The remaining ribs may now be installed, the top spar being put on last. When making ribs for a tapered wing, it is a good plan to make them all a 1/16 inch or so too long, at the rear end. Then they cut be cut to fit. Any of you who have had tapered wing ribs come out too short when being assembled will appreciate this. Of course, it is presupposed that the slots for the various spars are cut before assembly, getting the dimensions from the top view.

The procedure for assembling tapered wings as given above, may very well be followed for straight wings, thereby assuring proper alignment of the finished wings.

Wing tips are usually made of bamboo, bending them all from one piece, then splitting it to get the same curve. If the tips of a biplane are all alike, as in the S. E. 5, all four can be made from one piece. For small models, such as those of one-foot span, 1/16 inch diameter reed is very useful for tips. When laying out the wing outline on your board, always draw the tip shape as it should be, then the bamboo or reed may be glued in place, using pins to hold them to shape.

Some builders prefer built-up balsa tips. Since cross grain balsa is weak, several pieces must be used, placed as shown in Fig. 9. Such tips may be cut out roughly and glued in place, to be finished and smoothed off when the wing is removed from the board.

Fig. 10 shows another form of tip, made from a block of balsa. This tip is best for use on tapered wings with a tip shape as shown. It cannot be used on circular or rounded tips because too much wood would be needed. The block of proper size is first cut to the proper airfoil shape, then the tip shape is cut out. Finish it off after the wing is removed from board.

Always brace the tips well, for they not only take up considerable shocks in landing, but, if unbraced, the paper or other covering will pull them out of shape when

(Continued on page 41)

## MODEL AIRPLANE NEWS

Real Hot News for Model Builders and Dealers! Compare these prices and learn what REAL NEWS this ad brings you.

36" Sheet Balsa		Thinner	
1/32 x 2	.2 for 7c	2 ozs. .... 8c	
1/16 x 2	.2 for 7c	Thrust Bearings	
1/8 x 2	.2 for 9c	.025, .035, .2 for 3c	
1/4 x 2	.2 for 12c	Motor Rubber	
1/2 x 2	.2 for 15c	.045 sq. 1/16 sq. 1/16	
1/16 x 3	.2 for 6c	flat, 1/4 flat, 2 ft. 1c	
1/8 x 3	.2 for 8c	3/16 flat, 5 ft. .... 2c	
1/4 x 3	.2 for 12c	Reed	
1/2 x 3	.2 for 15c	1/16 or 1/4 dia. 5 ft. 3c	
36" Balsa Strips		Music Wire	
1/16 x 1/16	.2 for 1c	.014, .020, .028, .031	
1/16 x 1/8	.2 for 1c	5 ft. coil .... 1c	
1/8 x 1/8	.2 for 1c	Balsa Wheels	
1/8 x 1/4	.2 for 3c	Machine Carved and	
3/16 x 3/16	.2 for 3c	Polished	
1/4 x 1/4	.2 for 5c	1/2" or 3/4" pr. .... 4c	
1/2 x 1/2	.2 for 11c	1 1/2" pr. 7c; 1 3/4" pr. 11c	
36" Plank Balsa		Bushings	
1 x 3 x 36	.25c	4 for .... 1c	
1 x 6 x 36	.40c	3/4 or 1/2 o.d. .... 1c	
2 x 3 x 36	.70c	Shredded Bamboo	
Propeller Blocks		.045 sq. x 10" .... 1c	
5" x 1/2 x 3/4	.3 for 2c	Insignia Sheets	
6" x 1/2 x 3/4	.3 for 2c	24 insignias and ruler	
7" x 1/2 x 3/4	.3 for 2c	stripes 4 countries, sheet .... 1c	
8" x 1/2 x 3/4	.3 for 2c	Ready Cut Out Insignia	
10" x 1/2 x 3/4	.3 for 2c	1/2" or 3/4" pr. .... 2c	
12" x 1/2 x 3/4	.3 for 2c	3" pair .... 3c	
Formed Propeller Blanks		German Crosses	
2c each extra.		1/2" or 1" pr. .... 1c	
Jap Tissue		1 1/2" pr. 7c; 1 3/4" pr. 11c	
White, 20x24	.2 for 5c	3/4" or 1" pr. .... 1c	
Colored tissue, 2" for 5c		3/4" or 1" pr. .... 1c	
Dope, Clear or Colored		Balsa Dowels	
1 oz. 6c; 2 oz. 10c		3/4" or 1" pr. .... 1c	
Construct-A-Land Cement		3/4" or 1" pr. .... 1c	
1 oz. 7c; 2 oz. 12c		3/4" or 1" pr. .... 1c	
Remit by cash or money order. No C.O.D. No stamps. Orders less than 50c not accepted. Add 15c for postage up to \$1.50, for \$1.51 and over 10c. Dealers send for special discount.			

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18" Balsa Strips		Para Rubber	
1/32 x 1/16	.25 for \$0.05	.045 sq. .... 25 ft. .06	
1/16 x 1/8	.22 for .05	1/8 flat .... 25 ft. .07	
1/8 x 3/16	.20 for .05	1/16 square .... 25 ft. .08	
1/4 x 1/4	.10 for .05	3/16 flat .... 25 ft. .11	
1/2 x 1/2	.10 for .05	Small or large 1 doz. .15	
18" Sheet and Plank		Washers	
1/32 x 2	.7 for .10	1/4" dia. doz. 0 1/2 gr. 10	
1/16 x 2	.7 for .10	1/2" dia. doz. 0 1/2 gr. 10	
1/8 x 2	.5 for .10	Insignia Sheet	
3/16 x 2	.4 for .12	24 different .... 10	
1/4 x 2	.4 for .15	Clear Dope—Thinner	
1/2 x 2	.4 for .15	2 ozs. .... .07	
3" x 2	.1 for .20	4 ozs. .... .13	
3" x 3	.1 for .22	1 Pint. .... .40 Quart. .75	
For 36" lengths double		Colorless Cement	
18" length cost.		2 ozs. .... .50	
1 pt. .... .50		1 pt. .... .50	
Propeller Blocks		Japanese Tissue	
5" x 1/2 x 3/4	.3 for .05	Jap. Tissue .... 2 for .05	
6" x 1/2 x 3/4	.3 for .05	Colored Jap. Tissue	
7" x 1/2 x 3/4	.3 for .05	(red, blue, orange,	
10" x 1/2 x 3/4	.3 for .07	olive drab, white, ..	
Celluloid Parts		per doz. .... 20	
3/4" diam. .... .05		Reed and Bamboo	
1" diam. .... .07		1/16 reed .... 6 ft. .03	
1 1/2" diam. .... .09		1/16x1/4x15" Bamboo	
2" diam. .... .15		12 for .06	
3" cyl. motor .... .23		1/16x1/4x15" Bamboo	
1 1/2" cyl. motor .... .15		12 for .03	
2" cyl. motor .... .20		Piano Wire	
No orders under 50c. Add 15c for packing and postage to orders under \$1.50. Orders over \$1.50 add 10 per cent. When ordering 36" lengths add extra 10c. Money Orders Preferred.		All sizes .... 5 ft. .03	

MERCURY MODEL AIRPLANE CO., Dept. 4  
1592 Lincoln Place Brooklyn, New York

## Whats and What Notes

(Continued from page 40)

tightened. Fig. 6 shows a properly braced tip. L and M are continuations of the top and rear spars respectively, while N goes to the tip from the top of the rib the same as does L.

**B**EFORE going farther it may be mentioned that very good wings can be made of sheet balsa. These are best for small models, but wings up to two feet or more can be made this way. Usually only one or two ribs are needed, one at the center, and if the wing is long, one more about halfway to the tips. The sheet is first cut to the shape desired, and moistened lightly on top. It can then be bent to the proper curve and the ribs glued on the under side. The whole should be pinned to a board while drying. If dihedral is needed, make the wing in two halves, with an inside end rib on each. These ribs may then be sanded to the proper angle and glued flat against each other, the wing tips being propped up to the correct height and left to dry. It is not necessary to cover the lower side as this will add weight. Needless to say, the wood for a wing such as this must be selected with care in order to be light enough. Very thin balsa about 1/64 inch is sometimes used to cover the leading edge of a wing, going from the nose to about one-third the way back, or to the highest part of the rib curve. This makes a very fine job if well done, and yet adds but little to the weight.

If you wish to get a smoother front shape on your wing, and yet do not want to

use a large number of ribs, the desired result can be obtained by using a nose rib between each two regular ribs. These nose ribs may be very thin and serve only to hold the paper out to the proper shape. On straight wings, they may have the same curve as the regular ribs. If the bottom of the wing is flat they do not need to extend down to it. Fig. 7 shows a nose rib to be used with the large rib shown. Of course,

(Continued on page 42)

## Aviation Advisory Board

(Continued from page 33)

of lift from less wing area. Thus, a certain amount of weight will be eliminated because of the cutting down of the amount of construction necessary, or vice versa, from the same amount of wing area at any given speed, you will get greater lift. On the other hand, with the same amount of wing area, you may reduce the speed considerably and yet obtain the same amount of lift.

Here is a question from Robert D. Bessel, of East Douglas, Mass. Those who are building gliders may be interested in it.

Question. What is the best kind of wood to use in the construction of the framework of the primary glider?

Answer. Spruce is the best material that you can use. It should be straight-grained and free from knots. Spruce has greater strength for a given weight than any other wood.

Question. What instruments would I need to construct such a machine?

Answer. I would suggest the following: wood saw, cross-cut and rip; small metal saw, wood plane, vise, wrenches, screw-

drivers, flat and round files, small hammer, drills of various sizes with a brace or electric drill to hold them, small and large pliers, wire cutters, small anvil, needle and thread. Also materials which go into the construction of the ship, such as Casco Blue, Duco cement dope, small screws and brads, small rivets and bolts. There are many other conveniences in the line of tools and material that may facilitate your work.

## AIR-WAYS

(Continued from page 31)

Steve Laynor, 1'-08 1/2", 66 Congress Street, Newark, N. J.

Leon Haynes, 1'-05", 143 West 138th Street, New York, N. Y.

Ernest Shannon, 1'-12", 85 Lenox Avenue, New York, N. Y.

Edward Grannis, 1'-11 2/5", 1615 Kennedy Street, N. W., Washington, D. C.

Richard Lewis, 1'-03", 49 Ardmore, Providence, R. I.

Bernard Collins, 1'-01", 328 Plainfield Street, Providence, R. I.

### STOUT INDOOR.

Joseph Kovel, 13'-3", 404 Bristol Street, Brooklyn, N. Y.

Emanuel Enderlein (18), 12'-50", 316 Fountain Street, Philadelphia, Pa.

Carl Goldberg (19), 12'-38", Anderson Road, Purchase, N. Y.

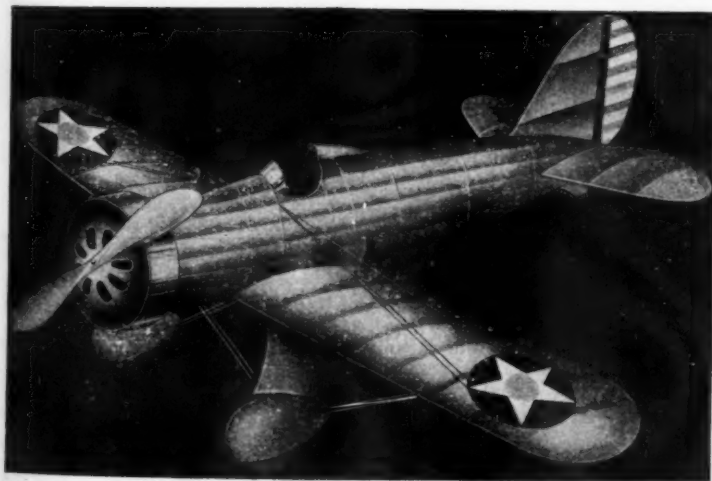
Emanuel Radoff (17), 9'-05", 535 South 16th Street, Newark, N. J.

Jessie Jessen (16), 9'-00", 2853 North Marshall Street, Philadelphia, Pa.

Robert Wilde (16), 8'-54 4/5", 3821 Dearien, Philadelphia, Pa.

(Continued on page 43)

## Here's the Latest Development in Military Planes ... build this Ideal-Designed



## Flying Model of the New Boeing Pursuit Plane

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Strips	Sheets
1/32 x 1/16..... 9 for 2c	1/32 x 2..... 5 for 8c
1/16 x 1/16..... 9 for 2c	1/20 x 2..... 5 for 8c
3/32 x 3/32..... 9 for 2c	1/16 x 2..... 5 for 8c
1/8 x 1/8..... 4 for 1c	3/32 x 2..... 5 for 11c
1/4 x 1/4..... 2 for 1c	1/8 x 2..... 4 for 12c
1/4 x 1/2..... 3 for 4c	3/16 x 2..... 3 for 12c
1/2 x 1/2..... 3 for 8c	1/4 x 2..... 2 for 12c
1/2 x 1..... 2 for 8c	1/2 x 2..... 1 for 10c
1 x 1..... 1 for 8c	

Balsa Planks	Para Rubber
1 x 2 x 24..... 15c	A fresh supply always
2 x 2 x 24..... 30c	1/32 sq. 50' 7c, 100' 13c
3 x 2 x 24..... 35c	3/64 flat 50' 9c, 225' 40c
2 x 4 x 24..... 25c	1/16 flat 50' 3c, 225' 50c
2 x 6 x 24..... 50c	1/8 flat 50' 13c, 225' 55c
2 x 8 x 24..... 45c	3/16 flat 50' 18c, 225' 75c
2 x 4 x 40..... 60c	

Jap tissue Grade A, 2 sheets 5c; Grade B, 3 for 5c; Colorless cement, large 4 inch tube 8c, Pint, 60c; Piano wire Nos. 4 to 18, 18 ft., 2c; Washers, 2 doz. 5c; Winders, double geared, 30c each; Bamboo, 4 pieces, 1c

CELLULOSE PARTS	DRAG RINGS
9 cyl. Dummy motor, 3" diam. 28c, 2" diam. 20c, 1 1/2" diam. 15c, Fans for 3" or 1 in. wheel 12c pr. for 15c	1 1/2" diam. 20c
or 1 1/2 inch wheel 25c pair, Wheels 3/4" diam. 14c pair; 1" diam. 6c pair; 1 1/2" diam. 8c pair, 1 3/4" diam. 12c pair, Cowlings 20c each.	2" diam. 25c
COWINGS (Open Face; or N.A.C.A. Open or Closed Type.)	2 1/2" diam. 28c
1 1/4" diam. 20c	3" diam. 30c
1 1/2" diam. 25c	3 1/2" diam. 35c
1 3/4" diam. 28c	4" diam. 40c
2" diam. 30c	
2 1/2" diam. 35c	
3" diam. 40c	
3 1/2" diam. 45c	
4" diam. 50c	

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3/16 x 3/8..... 9c	1 1/2" long... 25c	1 1/2" long... 30c
1/4 x 7/16..... 10c	1 3/4" long... 25c	1 3/4" long... 35c
5/16 x 1/2..... 12c	1 1/2" long... 25c	1 1/2" long... 35c
7/16 x 7/8..... 18c	1 3/4" long... 30c	1 3/4" long... 35c
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## Whats and What Not

(Continued from page 41)

on a tapered wing, the nose ribs must be progressively shorter, just as the large ribs and may be made the same general way.

The writer does not advocate cut out ribs, except, perhaps, for exhibition models, as they are too fragile for continued flying use. Instead of cut-out ribs, you can save just as much weight with a lot less work by using thinner sheet balsa.

It is preferable to make wings detachable, especially in the larger models, as this system serves a dual purpose. The model is much more easily transported or stored if the wings come off. A more important point, however, is that detachable wings are a fine means of absorbing shocks. When the ship strikes an obstacle, the force of the blow which is used in moving the wing would otherwise break a spar or cause other damage. Of course, detachable wings are a little heavier than the fixed type, so if you want to save all the weight possible, do not use them.

ON endurance models, especially of the single stick type, the wings are often fastened on with wire clips of various shapes which slip onto either the motor stick or a similar piece provided for the purpose.

Very often it is convenient, especially on commercial type endurance models, to hold the wing on with rubber bands around the fuselage. These bands may go over the wing, or they can be fastened to wire clips glued to edges or bottom of the wing. The latter scheme is much the neater.

The clip or rubber method of fastening has the added advantage of allowing forward and aft movement of the wing for purposes of balance.

However, when we come to strict scale copies of large airplanes, the best method is the use of wing pins on the fuselage or center section, which fit into holes in the spars, or much better, into pieces of small aluminum tubing bound to the sides of the spars. When holes are made in the spars, the pins always enlarge them after some use. With the tube method, this cannot happen, and the pins can be bent slightly in the middle so they will hold the wings firmly.

Another great advantage of the wing pin method over all others is that the all-important dihedral can easily be used, yet, if the model is to be used for exhibition, the wings can be flattened out to a very slight angle or none at all, as the big ships are usually rigged.

When the wing pin method is used on a low wing model where the wings come up against the fuselage, always use balsa spars across the fuselage and bind one wing pin to each end. The whole assembly may then be glued in place on the fuselage, on blocks or any other way. When bending pins installed this way, always grasp the pin as near the fuselage as possible with a pair of pliers. Then hold the pin on the other side, not the fuselage, when doing the bend.

(Continued on page 44)

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100 sheets..... .85	2 in. dia. 1/2 doz. 1.15
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Para Rubber	Piano Wires
A Fresh Stock Just Made	For 1" wheel..... .45
1/32 sq.—500 ft..... \$ .50	For 2" wheel..... .60
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1/16 flat—500 ft..... 1.15	
3/16 flat—500 ft..... 1.58	
1/8 flat—500 ft..... 1.25	
Celluloid Wheels	Washers
3/4 in. dia. 1 gross 1 gross	Per gross 12—1,000—No. 4 to 15—25 ft. 1.00
1 in. dia. 1.10 2.15	
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1 7/8 in. dia. 2.85 5.65	
Cowlings	Aluminum Drag Rigs
Open Face or N.A.C.A. type	1 1/2" diam. 6 @ \$1.00
1 1/2" diam. 6 for \$1.00	1 3/4" diam. 6 @ 1.10
1 3/4" diam. 6 for 1.25	2" diam. 6 @ 1.25
2" diam. 6 for 1.50	2 1/2" diam. 6 @ 1.40
2 1/2" diam. 6 for 1.75	3" diam. 6 @ 1.50
3" diam. 6 for 2.25	3 1/2" diam. 6 @ 1.60
3 1/2" diam. 6 for 3.00	4" diam. 6 @ 1.80

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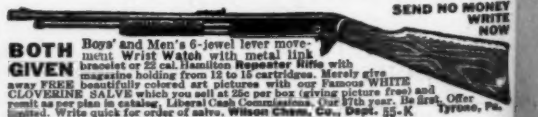
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age paid.  
1/32x2x18 Balsa..... 7 for 10c  
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1/4 x2x18 Balsa..... 45c  
1/2 x2x18 Balsa..... 75c  
3/8x2x18 Balsa..... 8 for 5c  
1/2 x2x18 Balsa..... 7 for 5c  
Hokone Tissue, Red, White, Blue, Green, Orange, Brown, Yellow, Black, 3 sheets, 10c  
1/32 sq. rubber, 75 for 15c  
3/64 sq. rubber, 50 for 10c  
3/32 flat rub. 40 for 10c  
1/16 sq. rubber, 35 for 10c  
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## AIR-WAYS

(Continued from page 41)

John Tyrrell (17), 8'-43-4/5", Ruunemede, N. J.

George Meeks (18), 8'-37-3/5", 2608 Myrtle Avenue, N. E., Washington, D. C.

Francis Schaidler (15), 8'-36", 41 West View, White Plains, N. Y.

Jimmy Throckmorton (18), 8'-28-2/5", 122 North Congress Avenue, Atlantic City, N. J.

Thomas Donohugh (18), 8'-25", Wesley Avenue, Nat. Park.

Seymour Henig (13), 8'-06-4/5", 166 Renner Avenue, Newark, N. J.

Lawrence Smithline (16), 8'-05", 301 West 109th Street, New York, N. Y.

Blair Bennett (15), 7'-56-4/5", 1410 M Street, N. W., Washington, D. C.

Ted Jaques (20), 7'-42", 595 Main Street, Portland, Ore.

Welcome Bender (16), 7'-37", 699 Newark Avenue, Elizabeth, N. J.

(Continued on page 45)

## Build a War Time Sopwith Dolphin

(Continued from page 12)

realistic. No bracing are used on the tail as it would be difficult to get at the rubber. The model is now complete except for the installation of the necessary rubber.

## Flying the "Dolphin"

The motive power consists of six strands of 1/8 inch by 1/30 inch "Para" rubber (approx. six feet) for indoor flying or calm outdoor flying. Should the builder be desirous of flying the "Dolphin" in windy

weather, which is not advisable, he may use eight strands of rubber which supplies the needed power. The rubber is rigged up in the usual manner and an "S" hook is employed so a winder may be used. By the use of a good rubber lubricant, more turns can be given the rubber, thereby increasing the duration. A winder of the five-to-one variety is used when winding the rubber, 500 turns can be given six strands and about 350 turns for eight strands. The last section is left open so that a winder may be used. Only a little slack is necessary.

The model should balance correctly, a heavy nose being built in. The original plane was perfect in balance, no adjustments whatsoever being made. Turning the rudder makes the model circle, but it may be left straight for distance. If the model does not balance correctly in flight, weight is added to the nose to stop stalling, or weight is added to the tail to stop diving (not likely).

Although the tests were made in cold weather the average duration was approximately sixty seconds. With the advent of warm weather, the duration should be about 25 per cent longer. A long steady climb is characteristic of this model as is also an exceptionally long and flat glide, which are both necessary to a flying scale model for duration. See the flying photographs for characteristic poses in flight, these were taken soon after it was launched.

Wind'er up and let'er go—good luck!

## Belgium's Greatest Ace

(Continued from page 39)

conquest and he wished it to be a certain one. At about 9,000 feet smoke started

trailing from the ship that bore the maltese cross and in another moment a streak of flame began issuing in her wake.

At the sight of the flames the Belgian nosed up. His first antagonist was doomed and he knew that proximity to an exploding gas tank might cause an unhappy ending for himself. He headed for home content and landed to find his initial conquest already on its way for official recognition and confirmation.

The second battle came soon enough when he ran against a pair of Aviatiks on the 23rd of the same month.

Evidently feeling there was strength in numbers the two Germans made for Thieffry at the same time that he turned to meet them. The Germans opened fire first and bullets were tearing through the fabric of his wings long before the Belgian set his own gun into action.

When he did finally commence shooting at the nearer of the two Boche ships his aim was well nigh perfect and a pretty patter of holes began appearing against the fabric of the fuselage. From nose to tail, back and front the Belgian played his gun until finally he found the mark he was striving for. The petrol tank finally succumbed to the barrage of steel and in a moment the whole Aviatik was a seething mass of fire.

Meanwhile, the second German had begun a haphazard fire upon Thieffry who turned his entire attention upon his assailant. When the latter saw his comrade fall in flames he quickly lost heart in the engagement and dove away, heading for the friendly protection of his own lines.

(Continued on page 44)

## FALCON ADVANCED MODELS hold the distinction



## MONOCOUPÉ 110

## MONOCOUPÉ FEATURES

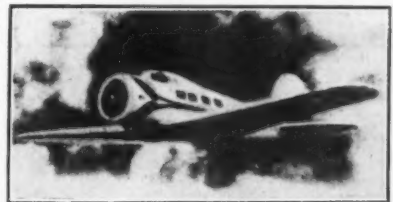
Prime Mover—Cell. Dummy Motor—Spun Aluminum Ring—Aluminum Cowl Plate—Cell. Balloon-type Wheels—Special Model Airplane Color. Winner of many National Air Race events. The model is a natural record-breaker without the prime motor, but with this marvelous device its performance is practically doubled. Kit for this 18" wing span model contains, besides the special features named, full size detailed drawing, large folder of instructions, and generous supply of material. Kit postpaid.....

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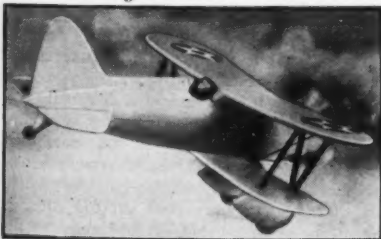
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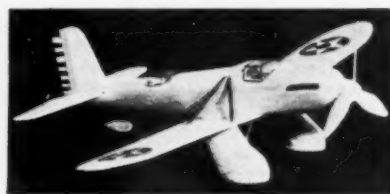
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It was not until the middle of May that this persevering flyer succeeded in bagging his third quarry and another month went by before the fourth German fell victim to his prowess.

This happy event occurred on July 3rd and not only did this battle loving Belgian succeed in entering the charmed circle but he broke away from it with a brace of victories. They came early in a prolonged fray that nearly ended in his own undoing.

It was early afternoon when Thieffry was returning home to Bruges after an idle morning during which he had not even sighted a German ship. The monotony of the day was suddenly shattered when a formidable group of fourteen Albatross appeared almost without warning from a heavy cloudbank above and surrounded him completely.

With ships all about him in this fashion, Thieffry's position seemed utterly hopeless. Under the circumstances Thieffry figured there was only one thing to do—attack. This, he reasoned to himself, would probably throw the Germans temporarily off guard and perhaps offer him an opportunity to escape from his unhappy plight. As soon as he had made up his mind he began operations. The suddenness of his act took the Germans entirely by storm and before any of them could avoid the murderous fire that Thieffry was dealing out, one of the fourteen was already dropping from the sky, the Belgian's bullets having almost taken one wing from the ship. This particular German barely had a chance to shoot in self-defense so suddenly and savagely had Thieffry thrust himself upon him.

This Albatross had hardly started its final descent before Thieffry was already wheeling about and adding further confusion to the ranks of the baffled Germans who had lost their close formation and scattered with the first onslaught of the lone Belgian. By this time the scattered forces of the enemy had begun to resume some semblance of order and started a concerted fire upon the Allied flyer.

Unmindful of the rain of shots that flew about him Thieffry again opened wide his own gun as soon as he could draw the bead upon another ship. His aim was still true and withering blasts that flew from his smoothly working weapon soon played havoc with the second ship he was engaging in as many minutes. Again success crowned his efforts and again a German ship parted company with its fellow fliers and dropped toward the shell pocked ground below.

Thieffry wisely headed for home immediately, knowing that with their still vast superiority in numbers, the Germans were too dangerous for any trifling. However, the enemy were content to see him go and so the brave, lone pilot brought his ship safely through the encounter and landed to receive the congratulations of his comrades upon having attained his acehood.

Lieut. Thieffry had taken an undisputed lead in the list of Belgian fliers with his tenth victory when, on the 23rd of February, 1918, he started out on one of his customary tours of the air seeking what foreign prey there might be lurking in the clouds. The day was cold and dreary and not a ship was in sight anywhere on the horizon. The lieutenant had just about decided that there would be nothing doing that day and that in such weather the

cheery warmth of the barracks stove would make far more congenial surroundings than the ice laden clouds he was flying through, when he spied the dim outlines of two ships far to the westward scurrying toward the German lines.

The Boches had a good start on him and by the time that Thieffry had caught up with them all three were already over the German lines. Unmindful of his position the Belgian opened fire on the pair as soon as he caught up with them.

The Germans circled away at first, one turning right and the other to the left. The Belgian had no alternative then but to chase one at a time. Both being Fokkers, fast new ships with a high degree of maneuverability, Thieffry had a real fight on his hands. He dove in unflinchingly on one of them and poured a hail of lead into it that made the Fokker shudder from prop to tail. The German ship seemed to waver a moment at the impact and for an instant Thieffry forgot himself in anticipation of the "kill." He drew closer to finish his foe, completely unmindful of the fact that a second ship was in the air ready to strike.

It was just the moment the Boche was waiting for. He came up under the Belgian's tail and found a vital spot with practically his first round of shot. Thieffry's ship burst into flames and began to fall almost immediately. The Belgian made an effort to right his ship but the whole hull became a blazing mass with the lieutenant helpless at the control.

Finally it crashed well behind the German lines and the wreck was soon completely enveloped in flames. Allied observers who had viewed the combat from a distance were convinced that Thieffry had died instantly but within a few days reports came out of Germany that he had been taken prisoner. Apparently a miracle had happened and by some strange trick of fate he had escaped the torturous death that seemingly had befallen him.

However, no official confirmation of this report could be gotten from the German General Staff and so for a time the fate of Lieut. Thieffry lay in doubt. No direct word came from the Belgian officer himself either and the hopes his fellow officers were holding for his safety began to dwindle.

At last the announcement was officially given out from Germany that the Belgian hero had been killed in the crash. He had died as one of the leading aces of the Belgian Air Force and maintained his position of leadership with the first three of his fellow countrymen until the close of the war.

## Whats and What Not

(Continued from page 42)

ing. Thus the balsa spar connecting the two pins takes all the strain. Incidentally, the spar should be of the same size as the corresponding wing spars.

On a biplane model it is usually convenient to build a regular center section, separate from the wings, to the spars of which are bound and glued the wing pins. The center section scheme is also convenient where the wing rests on top of the fuselage as in a cabin monoplane.

In our next article we shall start with the subject of wing struts and their construction.

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**Air-Ways**  
(Continued from page 43)

John Young (17), 7'-34", 241 East 49th Street, New York, N. Y.

Edward Beshor (17), 7'-29", 76 Seneca, Tuckahoe, N. Y.

Frank Zaic (20), 7'-20", 328 East 6th Street, New York, N. Y.

Edward Mosca (16), 7'-13", 107 South Albion Place, Atlantic City, N. J.

John Zaic (18), 7'-00", 328 East 16th Street, New York, N. Y.

William Coughlin (18), 7'-05-2/5", 194 Warren Avenue, East Providence, R. I.

Lewis Millman (17), 6'-41-4/5", 132 Columbia Place, Atlantic City, N. J.

Alton Du Flon (15), 6'-30", 561 Prospect Avenue, Ridgefield, N. J.

Salem Barrack (15), 6'-22-4/5", 198 Baltic Street, Brooklyn, N. Y.

John How (17), 6'-17-1/5", 3169 Reach Street, Philadelphia, Pa.

Henry Runkel (18), 6'-16-2/5", 10 Beechwood Place, Elizabeth, N. J.

Henry Orzechowski (18), 6'-08", 411 18th Avenue, Newark, N. J.

Alfred Rubin (16), 6'-08", 112 Dewey Place, Atlantic City, N. J.

Merrell Malley (14), 6'-03-1/5", 31 North Penn Avenue, Atlantic City, N. J.

Jerome Kittel (16), 6'-00-1/5", 130 Winthrop Place, Englewood, N. J.

Harold Franke (14), 5'-57-1/2", 822 Madison Street, N. W., Washington, D. C.

**STOUT FUSELAGE.**

James Parkam (16), 4'-57", 5536 Arsenal Avenue, Indianapolis, Ind.

John Zaic (18), 2'-57", 328 East 6th Street, New York, N. Y.

Henry Orzechowski (19), 2'-38-3/5", 411 South 18th Street, Newark, N. J.

Jesse Jessen (16), 1'-45-2/5", 2853 North Marshall Street, Philadelphia, Pa.

Gordon Light (17), Oak Street, Lebanon, Pa. (1440)

Paul Schaefer (16), 1'-18", 3607 East 16th Street, Indianapolis, Ind.

Dick Trimarco (20), 1'-13-4/5", 166 Elm Street, Newark, N. J.

Welcome W. Bender (17), 1'-08", 699 Newark Avenue, Elizabeth, N. J.

Michael Lichstein (19), 1'-03-3/5", 3099 Kensington Avenue, Philadelphia, Pa.

Frank Zaic (20), 59-1/5", 328 East 6th Street, New York, N. Y.

**Mr. CLAUDE E. CARMICHAEL, Director** of the Stix Baer and Fuller Model Airplane Club, lets us in on some interesting activities which took place in the vicinity of St. Louis. He writes the following:

"We've just completed our annual summer contests—the 1932 Model Air Races. It was a four-event series lasting four days, July 21, 22, 23 and 24, and our club membership of nearly 500 boys gave us a crowded flying schedule for each day.

The events were: Indoor, Outdoor Commercial, Outdoor Autogiro and Outdoor Duration for twin-pushers and tractors. Three silver cups were awarded by Stix, Baer and Fuller in each of the contests and the two boys who made the best average time for the series were sent to Round-Up Lodge, Buena Vista, Colorado, for five weeks of camp life with all expenses paid. Stix, Baer and Fuller also gave each boy complete camp outfits as required by the lodge—high-top boots, 10 gallon hats, sweaters, etc.

(Continued on page 48)

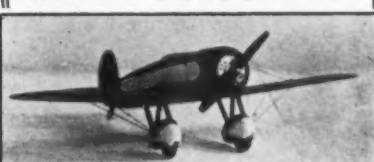
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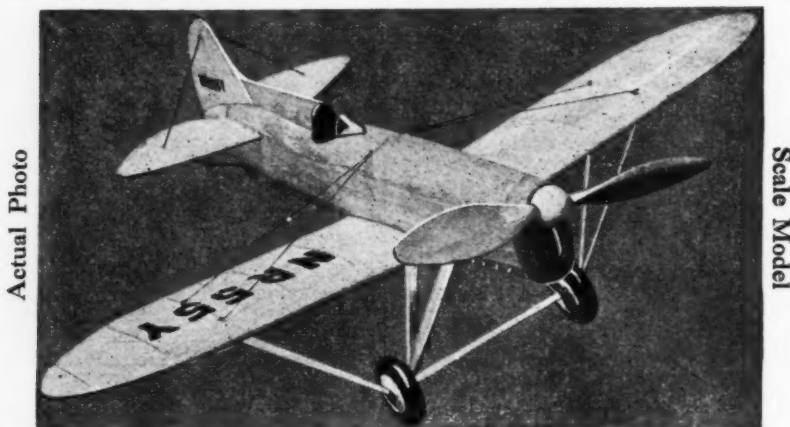
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## A Pioneer Makes Good

(Continued from page 5)

argue him into sticking to the "regular" way of designing airplanes. As he explained years later, in his "Wings of Tomorrow":

"It would have been virtually impossible to have achieved any success with the idea of the Autogiro unless I had been able to calculate its basic design by mathematics before I began to build it. Success by mere experiment would have been as unlikely as the successful construction of a cantilever bridge without any previous engineering experience. More so, indeed, for the problem was far more complex and the risks of error far greater. Without a little certainty of science on my side, I might have spent my energies in a dozen different directions, all of them wrong, and never found the secret of the Autogiro."

THE long story of these calculations will never be told, and a story in figures and formulas would not be quite in keeping anyway. But as time went on Cierva got to rotating a hazy idea in his mind. Keeping an airplane up takes speed—but if you could get the air rushing past the wings without rushing your whole machine through the air, you'd have the whole problem solved!

The top helicopter seemed to prove that it could be done. When its rubber-band power was gone it would slowly descend, the whirling vanes rotating in the air. Thus the "free-wheeling" rotor acted as a sort of air-brake, letting the toy down slowly and easily. Maybe you couldn't go straight up with a man-size machine like that because your motor would be too heavy. But couldn't you climb, descend, or fly level?

Telling no one of his fool idea, he went to work and figured out the size of a whirlingig able to support a man-carrying machine. It would be like a big windmill turned flat, its blades sweeping over the pilot's head. Would the blades keep on turning—even when you turned the motor off? Could they be made strong enough? Could such a crazy rig be controlled? There were many such questions to be answered. In his new fish-pond, he didn't know whether he would catch a whale of a new idea or just minnows.

He figured his way up steep graphs and down the other side. He took sharp curves on high, crashed his way through bristling equations and wicked formulas. He used up reams of scratch paper and bales of pencils (he could afford plenty of those at least). He studied helicopters and wing-flappers, and finally shook his head at both.

His engineering training helped him immensely. He could make fifty models on paper for one in the shop. He saved months, perhaps years of valuable time, while he tried to grab out of thin air a brand-new idea. Eventually he evolved as "goofy" a rig as one could imagine; a windmill turned flat, attached to a fuselage, all the weight to be suspended from the windmill vanes. These were to be rotated by the air itself, just as moving air turns an ordinary windmill. What a freak!

He had to have something to make his rig go forward. Birds, with strong muscles to the very tips of their wings, fly by flapping, and fish swim just as successfully by

(Continued on page 47)



wiggling their tails. But men have found no way—perhaps never will—to make machines of similar strength with extreme lightness. Man and machine weigh far more than the greatest birds of today—whether nature ever made a true flying creature weighing tons, or whether those great winged beasts merely glided—science is not prepared to say.

So Cierva finally settled on the good old propeller, driven by regulation motor, to pull his theoretical machine along.

But a real difficulty had arisen during this building of an airplane on paper. As the rotor rotated like a windmill on its back, each blade as it advanced into the oncoming air would naturally have more lift than the blade retreating at the same instant. The other blades would be acting similarly, in lesser degree. The total result would be that the side of the windmill with greatest lift would always be trying to "hump itself," and the whole machine would tilt toward the side with least lift. That is the sort of thing the engineer finds out even before he builds his brain children.

Cierva thought it over for a long time. One day a brilliant solution popped into his head. Why not two rotors, one above the other, turning in opposite directions? Then the lopsided lift of one would (theoretically) balance the other.

IT WAS a weird and complicated machine which he finally began to put together. There was a lot of work to be done before the first whirling aircraft was erected, with its funny wings carried on a mast braced to the top of an ordinary fuselage. Those first wings were stiff and rigid, solidly fastened to bearing and hub. There was no aeronautical reason that anyone knew, why stiff wings, rigidly fastened, would not work. It was some twelve years ago that this strange bird was finally hatched.

They pushed the contraption out of the shop, warmed up the motor, and got the two rotors turning in opposite directions (it made you dizzy to watch it). A regular pilot climbed in and tried to taxi for a take-off.

The machine trembled. Then, before anyone could do anything, it laid down weakly. Its vanes hit the ground and broke off with loud cracks. They had exhibited no more lift than if they had been made of stone. The bottom rotor, in the slipstream, had turned much faster than the upper one, working in undisturbed air. All this was very discouraging, or would have been to a weak-kneed inventor.

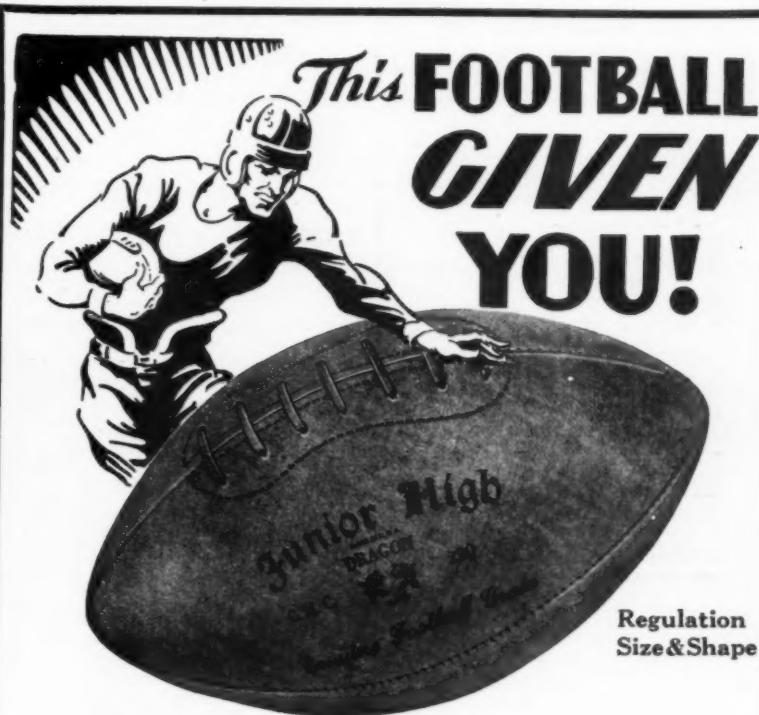
But Cierva, being an engineer, went back to his aerodynamics and lift tables and stress calculations. The rules, including his well-oiled slide-rule, said those rotating vanes should have lifted his machine easily.

BUT the weakness he had tried to correct with the double rotor still remained. The tendency to tip over on the side of least lift was to plague him a long time and cause his hair to grow thin in places.

At length, with the help of capable, if sceptical mechanics, he had a new full-sized model ready to fly. This one had only one rotor, but the blades were rigidly fastened. He still did not know whether it was possible to keep the machine right-side up.

The rather nervous pilot took it out and taxied. A few yards of run, with the rotor

(Continued on page 48)



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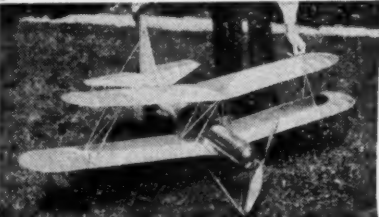
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Most of us have been interested in stamp collecting at one time or another, and doubtless a good many readers of "Universal Model Airplane News" are philatelists, but it is a very large undertaking to attempt a general collection today. Only the very wealthy can hope to make an impressive showing, unless the collection is limited along certain lines, but it is not hard to make a good showing in Air Mail Stamps.



The first Air Mail Stamp was issued in 1917, and since then only about 1,700 varieties have appeared. Most of them are quite cheap, but the common stamps of today are sure to become much rarer as time goes on. Everything has been made inviting for the collector. Splendid albums ranging in price from \$3.00 up are on the market as well as catalogs devoted exclusively to Air Mail Stamps. Air Mail Stamps are doubtless the most delightful branch of Philately and consequently every day more collectors are being attracted to this specialty.

How many readers know that the great painter and all-around genius da Vinci spent a great deal of his time discovering a method of flying? Only recently a great European government saw fit to issue a special series of Air Mail stamps in honor of the great da Vinci.

Do you know that the famous old Columbia was the only plane that ever crossed the Atlantic twice? I'll bet it will be no easy matter for you to recall who was the pilot and navigator to take her across the pond the second time.

As far back as 1870, many thousands of letters were sent through the air by regular balloon service. No other way was possible because the place was besieged.

Only fourteen years ago the country which has the largest air mail service in the world could only boast a route approximately 250 miles in one direction. Today this same country has air routes in every direction over thousands of miles.

All of these wonderful historic facts and many more which mark the progress of aviation are well-known to Aero-Philatelists.

Why not make a start and see what this fine hobby can do for you? We will be glad to help you in every way we can.

This department will be devoted to stories about Air Mail Stamps, news issues, important flights, etc., and will undertake to answer questions of general interest to collectors, but only Air Mail Stamps will be considered. Address communications to Mr. L. W. Charlat, care of "Universal Model Airplane News," 125 West 45th Street, New York City.

## A Pioneer Makes Good

(Continued from page 47)

up to a fair speed—and the whole thing just turned over and fainted, like a very sick cow. The blades snapped short. There were snickers. Perhaps Cierva said something—an old Spanish custom at such times. Many inventors would have had more than enough—going on two years—and this the best he could do!

But he went back to drawing board and slide-rule, scratching his massive head for new ideas.

His final No. 3 machine had five blades in the rotor, and he had on this an ingenious device whereby the pilot could change their angle of incidence at any time, thus varying their lift to right or left. "That should work," he told himself, to prevent tilting from side to side. But he was not so optimistic now. Was the test to fail—prove a regular "three times and out?"

(To be continued.)

## Air—Ways

(Continued from page 45)

Ralph Kummer, 16 years old, and Richard Prough, also 16, received these two grand awards. Kummer set a new record in the indoor contest with a flight of 11'-55-4/5". (Editor's note. At the National Contest at Atlantic City, September 10th, Joseph Kovel flew his plane 13 minutes 3 seconds, Stout Indoor.) Prough was able to bring his average to the winning point with a twin-pusher flight of 21 minutes. His plane was lost. Kummer also took first in the Commercial contest with a flight of 7'-45", and first in the Autogiro with 2'-6". Not satisfied with that, he ran away with third in the Outdoor Duration event with a flight of 12 minutes.

The Indoor was the first contest scheduled and was held in the St. Louis Arena. Ralph Kummer launched his model for the prize-winning and record-breaking flight of practically twelve minutes. Kummer's plane had a built-up or hollow motor stick and hollow wing spars formed by wrapping paper-thin balsa around a bicycle spoke. Many of the indoor models were covered with Microfilm.

THE Commercial and Autogiro contests, held at Parks Airport, East St. Louis, furnished thrills aplenty. This was the first autogiro contest ever held in St. Louis and it served as a novel and exciting experiment. Nearly 100 boys were entered but most of them had difficulty in getting more than delayed flights. We feel, however, that the diversity of original designs displayed in the contest was well worth the experiment. Contest regulations made it necessary for models to have rotor vanes with twice the area of the main wings.

Sunday was a big day. The Outdoor Duration contest was held at Parks Airport and we were extremely busy "from dawn to dusk." A bright, cloudless sky cheered the hearts of the contestants. It was about the middle of the afternoon when Richard Prough launched his model for its record flight of 21'-35". Fifteen minutes later William Exner got his plane off for a flight of 13'-37", taking second place."

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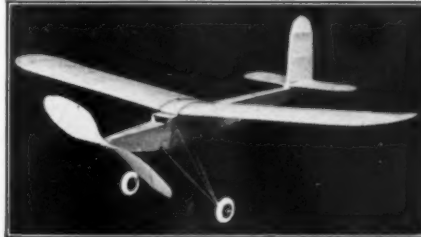
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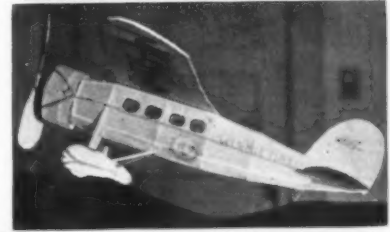
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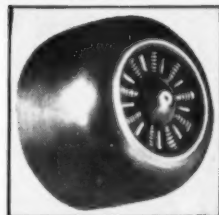
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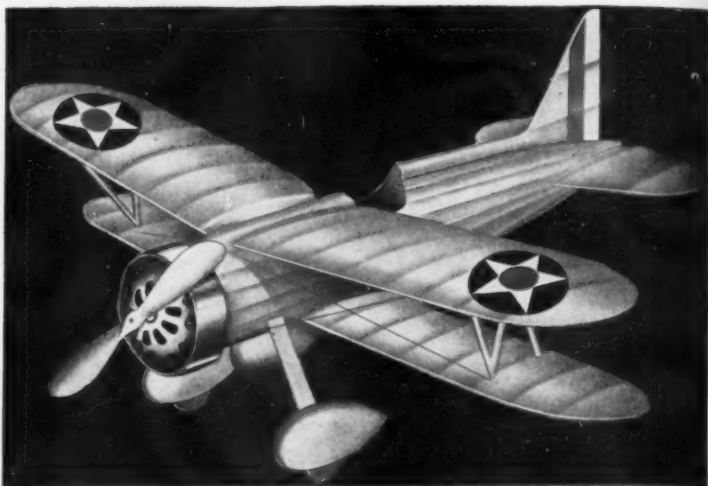
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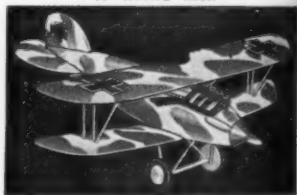
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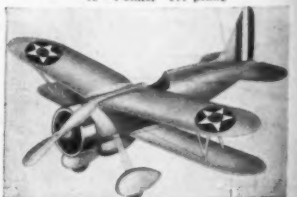
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